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VIEWS, NEWS AND INTERVIEWS.

Hon. Gardiner C. Sims, of Providence, R. I., who is chief engineer of the U. S. S. "Vulcan," the repair ship of the navy, writes from Guantanamo Bay, under date of August 10, as follows:

"Since June 6 we have worked every day, and for some time 24 hours per day, in watches of eight hours each. We have repaired 52 ships, some of them very extensively. We were at the bombardment of Santiago and Aguadores, and saw the left wing of the army advance on July 1. Have been through Morro Castle and batteries, as well as on board the wrecked 'Reina Mercedes.' Our letters and papers are always from seven to ten days late. Wish we knew what was being done with 'the high honor (?) of Spain.' Lieut. Dana Greene is here and many others well known in electrical circles."

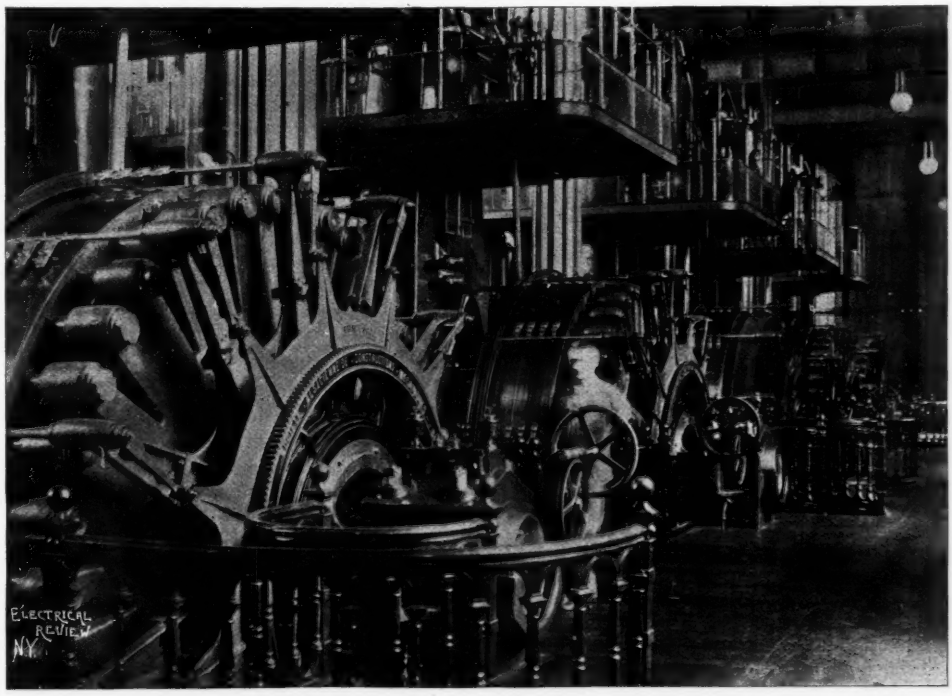
The Vatican at Rome, which contains 11,000 rooms, is to be lighted by electricity.

The Spanish ships destroyed at Santiago on July 3 were handsomely fitted up, especially as regards the electric fixtures. The bracket and desk-light fixtures used in the wardroom and officers' staterooms were of artistic patterns, handsomely chased and silver-plated. Several United States naval officers who visited the Spanish ships after their destruction found a number of these fixtures in serviceable condition, and the trophies now adorn their staterooms.

Successful demonstrations are reported to have been given in London by Lawson Tait, with his electric hemostat, an instrument which, as the name denotes, is intended for the arrest of bleeding in surgical operations. A platinum wire, arranged to carry a current, is enclosed in the blades of a pair of steel forceps or any other requisite utensil, the wire being insulated by a bed of burnt pipe clay. In practice, a current of suitable voltage is turned on, the artery seized and compressed, and in a few seconds the tissues and arterial walls are so agglutinated that the passage of blood is rendered impossible. The temperature employed is about 180 degrees Fahrenheit, showing a great difference between this and the electrical cauterizing instruments, and the necessity for a ligature is removed.

For fixing bolts in stonework, a German publication recommends a mixture of sulphur with Portland cement, in the ratio of three to one, as superior to either individual constituent.

In his recent presidential address to the British Medical Association Surgery Section, according to a London exchange, Dr. John Duncan said: "The other improvement to which I venture to direct your attention is the introduction of electricity into the infirmary. For 30 years I have preached in and out of season the surgical uses of electrolysis, but I feel assured that even now it has not met with the appreciation it deserves. Yet in cirsoid aneurism no other treatment can be compared with it for a moment. In nævus of the usual mixed variety, if you desire to avoid a scar, there is nothing so sure and so safe. It does excellently in some other forms of angioma. It gives good results in goitre. It is useful in uterine fibroma. It is an efficient depilatory. Many of these are common diseases, which ought to be treated by the ordinary surgeon, and I have hope, now that electricity is being introduced into our infirmaries, that electrolysis will come into greater favor, and that the surgeon will have no more hesitation in employing it in suitable cases than in performing lithotomy or amputating a finger."



A PARIS CENTRAL STATION—VIEW IN THE QUAI JEMMAPPES DYNAMO-ROOM.

PARIS CENTRAL STATIONS—QUAI JEMMAPPES.

BY L. BAYLY.

One of the most interesting among Paris installations is the large station established in 1888 by the Société d'Air Comprimé, on the left bank of the Saint Martin Canal. The building itself is an imposing one. The price of land having in this quarter of Paris risen enormously (the latest quotations amounting to some 500 francs per square metre), the American device—making up in height what one can not afford in breadth—has been adopted, and the highest tower—150 feet above the level of the canal—grants a splendid view over the whole city. This company's undertakings have most of them been on a large scale. Their original sources of power lay in two stations—that of the Boulevard Saint Fargeau and its twin sister on the Boulevard Richard Lenoir—from which over 25 accumulator stations were once commanded. The system proved slow and expensive, however, giving way, in 1893, to the five-wire distribution system, which has now been definitely adopted.

Three stations of accumulators have, nevertheless, been retained. They are fed by the installations of Saint Fargeau and Richard Lenoir. In both of them rotary transformers are used, whose secondary circuits are coupled in arc with the feeders.

To return to the station on the Saint Martin Canal. The building is divided into three stories. On the ground floor (35 feet in height) are grouped the engines and dynamos; on the first the boilers; coal bunkers and oil tanks occupy the third. This,

to the superficial observer, seems a strange and unnatural method of doing things, but there is method in the company's madness.

The question of weight—in a building where heavy mechanical contrivances are piled to a height of over a hundred feet, topping up with coal and water supplies—is one of the highest importance. The five Corliss engines at present used for working the dynamos amount, in the aggregate, to something like 350 tons, and the electrical gear comes to little less. The bulk of this ponderous mass reposes on the concrete flooring of the basement, which measures 300 feet by 50 feet.

I enclose a photograph of this splendid machine-room. The engines are of the Corliss vertical type, furnished with condensers and performing about 70 revolutions per minute. The horse-power, counted 1,200 for each engine, is reckoned 1,100 or so at the dynamo shaft. The coupling with the dynamos is of course direct, and the weight of the armature is counterbalanced by a heavy flywheel (31 tons) at the other extremity of the shaft. On account of the size of the engines, the cylinder bases, round which a steel gallery leads for purposes of inspection, form an intermediate story, where are located the manometers, etc., used to verify the working.

The Societé Alsacienne (perhaps the largest continental organization of its kind) is responsible for both engines and dynamos. The latter, as will be seen from the illustration, are sufficiently original in design to command some attention. The armature is wound somewhat after the model of the venerable "Gramme" ring, in 39 poles or sections. It presents the appearance, indeed, of a 39 pointed star and revolves on the outside of the electro-magnets, which are 12 poled and completely invisible. At 70 revolutions the current developed is 1,500 amperes under an electro-motive force of 500 volts, the total power amounting to 750 kilowatts. The brushes are of copper and divided into 12 series. They are supported by 12 radial arms of steel proceeding from a collar rotating easily round the central shaft. A cogwheel and screw gearing permits the position of these arms to be raised or lowered. An ingenious system has been devised for permitting the instantaneous adjustment of the brushes without the intermediate necessity of verbal orders—so exhausting and generally unintelligible in engine rooms. A dial furnished with four lamps of different colors hangs on the wall opposite each engine. A special code has been arranged. Thus the lighting of the red lamp means "raise the brushes," the lighting of the blue "lower brushes." The white lamp means "go ahead," the green one "stop," etc.

A single electrician, seated at a comfortable table in the distributing-room, gives the orders for the whole installation according to volt and ammeter readings. The trembling needles of the latter give the trouble as it stands, the pressure of a button does the rest. The boiler-room is on the first floor, 40 feet above the basement. The boilers are of the Belleville type, of tubular make, working at about 80 pounds to the square inch. The grate area of each amounts to 5.25 square metres, and the quantity of steam supplied is reckoned at 6,000 pounds per hour. They are grouped in series of four (four to each engine) and a small trolley works overhead for repair purposes.

The system of coal distribution is ingenious. From the carts in the yard beneath electrically-worked lifts raise the combustible as far as the roof, where it is tipped into funnel-shaped bunkers of iron. From here it falls down square steel shafts on to the boiler-room floor.

An iron bridge conducts us to another wing of the building where are situated the water tanks, and a large filter for purification purposes, boiler deposits being a thorn in the side of Parisian engineers.

The cables used to conduct the current are of 1,000 square millimetres section, and hail, like the rest of the mechanical contrivances, from the workshops of the Alsacian Company in Mulhouse. They are lead covered, laid directly in the earth, without conduits or casing. A complex system of rheostats permits the distribution to be regulated to a nicety.

As mentioned above, the large number of accumulator-stations once dependent on the Société d'Air Comprimé has been cut down to two or three. The most important of these is the Mauconseil station. The accumulators are 280 in number, divided into four groups and representing a total of 2,200 ampere-hours; 300 amperes has been found the maximum demanded at one time. They are charged either at normal tension or by over-voltage, as time or circumstances require.

Capt. W. L. Candee and family returned last week from a six weeks' visit in London, Antwerp and Paris. On the return the "Noordland" was laid up six hours with an accident to her engines, but this did not interfere with the enjoyment of the passengers, as there was no annoyance or fright over the slight delay. A magnificent iceberg was sighted.

TELEPHONE NEWS AND COMMENT.

The report of the Connecticut Telegraph Company shows: Capital stock paid in, $35,000; personal property, $38,576.56; debts, none; credits, $1,776.97.

The Drawbaugh Telephone and Telegraph Company, which recently obtained the sanction of Councils to establish a telephone service in Philadelphia, has decided on its plans, and states that it will begin work at once.

Senator Howard Gray, of Missouri, has brought suit against the Western Union Telegraph Company for three cents, for the purpose of testing the intent of the new revenue law. The Senator contends that when the law was framed it was intended that the tax should be paid by the corporation and not the individual sending the message.

A new schedule of telephone rates has been made by the independent lines of Iowa, as follows: For messages sent 20 miles, 20 cents; 30 miles, 25 cents; 40 miles, 30 cents; 45 miles, 35 cents; 50 miles, 40 cents; 60 miles, 45 cents; 75 miles, 50 cents; above that the charge will be one cent per mile. In a short time the independent telephone men will meet to plan consolidation.

The Sunset Telephone and Telegraph Company has just finished 35 miles of the long-distance telephone line which is to connect Tacoma and Spokane, Wash. The company will immediately begin on the renewal of the Tacoma–Portland wires. The residents of Puyallup, Sumner, Buckley and Enumclaw may now communicate directly with Tacoma, Seattle, Olympia and other cities in Washington, Oregon and California.

The New Telephone Company, of Indianapolis, has filed a mortgage to the Central Trust Company, of New York, for $800,000, to secure two series of bonds. The first is $300,000 six per cent bonds, due in three years. The second series, $500,000 five per cent bonds, falls due in 20 years. The trust company will hold the second series until the first matures, at which time $300,000 of the bonds will be applied to the payment of the first series. The remaining $200,000 will be used for extensions and betterment.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

FIFTIETH ANNIVERSARY MEETING IN BOSTON THIS WEEK.

The fiftieth anniversary meeting of the American Association for the Advancement of Science held its opening session at Boston on Monday, August 22. Over 250 new members were elected at the meeting of the council. At 10 A. M. the general meeting was held in Huntington Hall of the Massachusetts Institute of Technology, and judging from the number of delegates present and the character of the addresses this semi-centennial will go down into history as the most important ever held by the association. Delegates representing all branches of scientific activity were present from the great educational centers of this country, besides many who came from Canada and Europe.

The arrangements, which were in charge of the local committee, were superb, and nothing was spared to give the delegates the best the city could afford in every detail.

The first general session of the association was held on Monday at 10 A. M. in Huntington Hall, and the large auditorium was crowded. The meeting was called to order by the retiring president, Wolcott Gibbs, of Newport, R. I., after prayer by the Rt. Rev. William Lawrence, Bishop of Massachusetts. Addresses of welcome were delivered by His Excellency Roger Wolcott, Governor of Massachusetts; Josiah Quincy, Mayor of Boston, and President Crafts, of the Institute of Technology.

Governor Wolcott extended a most cordial greeting to the association and welcomed all of the members of the society back to the place of its birth. He also spoke of the great work being done by scientific men in their search for truth, and urged upon the association the continuance of its noble work.

Mayor Quincy said that Boston was the host of the association at this, its great jubilee meeting, and was grateful for the privilege of entertaining it, fully appreciating the favor conferred by holding its anniversary in Boston. He also dwelt upon some of the practical applications of the principles of science to municipal government.

President Craft, on behalf of the Institute of Technology, welcomed the delegates and spoke of the advantages of scientific research.

A message was read from the Russian Geological Committee of St. Petersburg, sending to the American Association the good wishes and congratulations of their society.

After the reports of several committees were passed upon, the meeting adjourned. During the week papers discussing recent advances on every branch of scientific investigation will be read. The programme includes over 200 addresses, and among them will be several important papers on electrical subjects. J. H.

Boston, August 22.

The Chicago & Milwaukee Electric Railway.

On July 1 a part of the Chicago & Milwaukee Electric Railway was put in operation. Although this line is not yet complete, and is now being operated by means of a temporary electrical equipment in the power-house, it is thought that the plans for the complete installation, which have been developed by Mr. Bion J. Arnold, the consulting engineer for the company, represent such a radical departure from ordinary electric railway engineering practice as to justify a brief description at this time.

The line may be called an inter-suburban road. It runs through the chain of Chicago's most beautiful suburban districts lying along the shore of Lake Michigan, between Evanston and Waukegan. When the road is completed it will be hard to imagine a more delightful ride than it will offer. Beautiful suburban and country homes are scattered all along the way. The southern portion of the road, which is not yet completed, unites in a chain the ideal suburban towns of Evanston, North Evanston, Wilmette, Kenilworth, Wennetka, Lake Side, Glencoe, Ravinia and Highland Park. North from Highland Park the line is now in operation. The government reservation at Fort Sheridan, the University at Lake Forest, the camping grounds at Lake Bluff and the manufacturing districts at North Chicago and Waukegan lend interest to this portion of the road. The route of the line is 30 miles in length, and parallels for the entire distance the Chicago & Northwestern steam railroad. The name of the road would seem to indicate that it might eventually connect Chicago with Milwaukee, 85 miles apart.

In the building of this line the engineer was confronted with the same problems that are usually connected with the installation and operation of a high-speed, long-distance suburban electric road. The burdensome investment in copper feeders, which would have been necessary to operate the road by means of a direct current station situated at the center of the line, made this system prohibitive. The inefficiency in operation of two power stations for a road of this size, or of a booster system operated from one power-house, was recognized. What was wanted was a system of generation and distribution which would represent a minimum amount of first investment; which would be capable of being added to as the load increases in a manner consistent with the original installation, and which would operate with a fair degree of economy from the start, and at the same time be capable of the highest operative efficiency when eventually completed.

The plan which was adopted, and which was thought to combine all these advantages, consists of a combination direct-current and three-phase alternating-current distribution system with a generating station placed at the center of the line. The sections of the road adjacent to the power station are supplied with direct-current from the power house itself. Sections of the line at a distance from the power-house get their supply of current from sub-stations. These sub-stations each contain a rotary converter, consisting of a three-phase alternating-current motor and a direct-current generator combined in one machine. The sub-station motors are supplied with power over a high-tension transmission line, consisting of three small copper wires extending back to the power-house. The direct-current from each sub-station is distributed to the trolley by means of the usual system of feeders extending in both directions. The location of these sub-stations and their distance apart is governed by the conditions of traffic and somewhat by the nature of the grades along the line. The development of this road and the economic results of its operation will be awaited with considerable interest.

As shown upon the map, Fig. 1, the power station is located at Highwood and the sub-station for the operation of the northern portion of the road is situated near the southern limits of North Chicago. Connecting the power-house with the sub-station is an eight-mile, 5,500-volt, three-phase transmission line of three No. 8 wires. From the sub-station the 00 trolley wire is reinforced by a 0000 feeder extending four miles south and a 000 feeder extending three and one-half miles north. The subway near the sub-station, by means of which the electric cars pass under the Northwestern tracks, is an interesting piece of engineering not yet completed.

In the construction of the track 65-pound T rail and 75-pound girder Johnson rails are used. The overhead work is of the side pole method of construction in the outlying districts, with center iron poles through the business district of each suburb. The high-voltage tie-line wires are supported on glass insulators, carried on wooden cross arms on the side poles. Each pole is painted, while those carrying the alternating-current lines have a danger notice stenciled upon them.

The line is at present operated on a single-track road, except in Lake Forest, and a block-signal system has been adopted to insure safety in operation. Of the 14 cars now being operated 10 are new 32-foot cars built by the St. Louis Car Company. The Pullman company is now completing for this company two fine standard inter-urban railway passenger coaches and two combination passenger and baggage coaches, each 38 feet long, equipped with two 50-horse-power motor equipments mounted on Peckham double-standard railway trucks.

The fares charged are about one-half the rates charged upon the Northwestern Railroad for the same distances.

The plan of the power station is shown in Fig. 2 and a sectional elevation in Fig. 3. The boilers are of the Cahall-Babcock & Wilcox water-tube type, made by Aultman & Taylor. Each boiler has a rated capacity of 250 horse-power, and they are set in batteries of two each in such a manner as to be entirely independent of the brick-work. The boilers are thus free to contract or expand, and the brick-work may be entirely removed and replaced, if required, without disturbing the boilers or connections.

A steel stack of sufficient capacity to handle the escaping gases from eight boilers is to be placed so as to be flanked on either side by four boilers. Three of these boilers are now installed. Fuel economizers will be placed at the back of each battery of boilers, with the by-pass flue beneath. Slack coal is used and is delivered in front of the boilers directly from the cars. The furnaces are of the Hawley down-draft type. The supply of feed-water is taken at present from the city mains, and is fed to the boilers by means of the Q and C system of boiler feeding.

The engines of the plant are of the horizontal tandem compound Corliss type, and run at 125 revolutions per minute. The dimensions of the one at present installed, Fig. 1, are 17 inches by 30 inches by 36 inches. This engine was made by the Filer & Stowell company, of Milwaukee, and is rated at 400 horse-power. The flywheel weighs 40,000 pounds, and is 14 feet in diameter. The governor of the engine is of the Provell inverted type fitted with automatic safety stops to prevent the engine running away. This stop blocks the governor balls up except in the event of the governor belt breaking. The device is arranged so as not to need handling at the starting or stopping of the engine. The present engine is of the side crank type. Future additions of engine units will be of the center crank type, as shown in Fig. 2, and will also be of double the rated power of the original unit. Each engine is also designed in all its parts so as to be capable of standing an overload of 100 per cent. This provision is made for emergency service, when the engines can be made to develop a power greatly in excess of their rating by admitting high-pressure steam into the receiver through a reducing valve.

The unique feature of the power station, however, is the electrical equipment. Two different types of generators are employed: generator No. 1, which is installed next to the engine No. 1, is an alternating three-phase generator of General Electric make. It has a capacity of 250 kilowatts at 125 revolutions per minute. This generator has 24 poles, and, therefore, delivers a three-phase current of 25 cycles per second. This current is generated at a potential of 5,500 volts, ready to be delivered directly to the transmission lines without the use of transformers. Generator No. 2 is a combination generator. It is also of 250 kilowatts capacity, and runs at 125 revolutions per minute. It can deliver its output, however, either as direct or as three-phase current. It has but one armature, but the windings of this armature are connected on one side to a commutator and on the other side to collector rings. The potential of the direct-current end is 600 volts, while the three-phase current is delivered at a voltage of 380. The generator can deliver an output up to its rated capacity of 250 kilowatts from either the commutator or the collector rings. It can thus be used to supply current directly to the trolley passing in front of the power station, or can be used to operate the motors in the sub-stations, or for both purposes at the same time, dividing the load in proportion to the demand. It will be noticed that generator No. 2 is of considerable lower voltage than generator No. 1. When the three-phase current from this generator is trans-

(Concluded on page 119.)

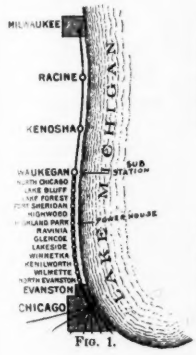


Fig. 1.

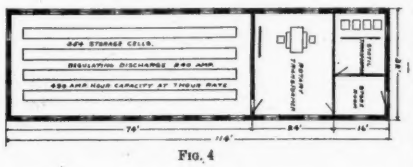


Fig. 4

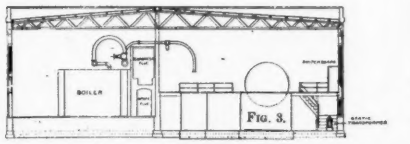


Fig. 3.

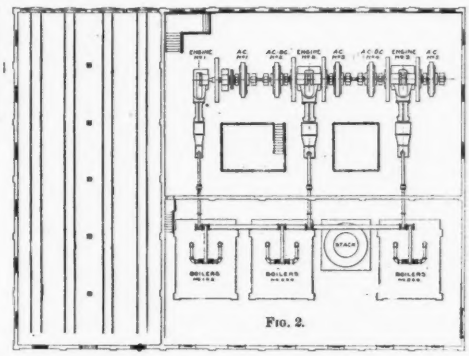


Fig. 2.

Figs. 1–4.—Diagrams Illustrating "The Chicago & Milwaukee Electric Railway."

SCIENCE ABSTRACTS.

The following extracts of interest to our scientific readers are from the official publication of the Institution of Electrical Engineers, London, edited by Mr. J. Swinburne:

Electrolytic Deposition of Silver and Its Separation from Copper. F. W. Küster and H. von Steinwehr—Instructions for the electrolytic determination of silver are to be found in many text-books, but notwithstanding that such directions are carefully followed, the results obtained by the authors, after many trials, are always uncertain and usually unsatisfactory. The directions given err in insisting upon the maintenance of a certain current-density, instead of a constant electromotive force. In order that the metal may be precipitated in a weighable form, it is essential that the electromotive force should not exceed a certain value; but as electrolysis proceeds, the concentration of the silver in the solution decreases and the resistance of the cell increases. If, therefore, the current is kept constant, the electro-motive force in the cell must increase, and may soon exceed the limiting value. Upwards of 100 experiments were made with a view to finding the most suitable experimental conditions. It was found that perfect precipitation is obtained when the solution (volume about 150 cubic centimetres), containing about 0.5 gram of silver, is mixed with one or two cubic centimetres of nitric acid, specific gravity 1.4, and five cubic centimetres of alcohol, the electromotive force being kept constant at 1.35 to 1.38 volts for from six to eight hours. Excellent results are obtained by this method of working, the maximum deviation from the mean of six analyses of an ordinary coin amounting only to 1 in 2,000.

Electrolytic Treatment of Tin Residues—In the manufacture of vessels of tinned iron there is a loss through waste of six to seven per cent, which, together with old rejected vessels, amounts to thousands of tons annually. The difficulties in the treatment of these residues arise from their large bulk, and from the presence, under the layer of tin, of an alloy of tin and iron. In some works caustic soda solution is used as an electrolyte, which dissolves the tin, but not the alloy of tin and iron. The iron left has therefore but little commercial value, owing to the relatively large proportion of tin still retained by it. In another recent process the scraps of metal are packed in wood frames and serve as the anode, while the tin is deposited upon cathodes of tinned copper. Dilute sulphuric acid is used as the electrolyte, and the iron is eventually completely dissolved and converted into the crystalline sulphate.

Thermo-electric Currents. Bakhmetieff, Christodulus, and Georgieff—The authors melt tin in a porcelain capsule into which are plunged wires connected to a galvanometer; the capsule is placed in a chamber which can be surrounded at pleasure by ice. The authors find that there is an electro-motive force in the circuit which remains practically constant as the tin solidifies and then diminishes. This electro motive force is greater the lower the temperature of the chamber. When the chamber is not surrounded by ice the temperature of the solidifying tin is 220 degrees centigrade, the average of the surrounding chamber during the whole time of solidification 85 degrees centigrade, and the electro motive force 49.9 microvolts. With the chamber surrounded by ice the figures are 218.5 degrees centigrade, 54.5 degrees centigrade, and 103.2 microvolts. The authors have also experimented with a tincadmium alloy.

Cathode Rays. E. Wiedemann and G. C. Schmidt—Cathode rays are usually present in two different forms—first, the ordinary slightly conical beam forming a solid cone of rays, and secondly, the beam diverging from about the same point as the other but in the form of a conical mantle, forming rings or ovals where it meets the tube. The authors have here investigated the cause of the latter and the influences which regulate its form. Its cause is attributed to rapid oscillatory discharges; and in the experiments the authors used tubes without electrodes, and excited discharges in them by means of a Lecher system of wires. The electrodes consisted of balls or rings pressed against the outside of the tube. The angle of the cone of rays diminishes with the curvature of the glass, increases rapidly with the curvature of the electrode, and increases rapidly with diminution of pressure of gas. The authors suggest the following explanation of these and all similar phenomena:

1. Rapid oscillatory discharges in rarefied gases take place near the surface as in metal conductors, but in gases are prevented from reaching the surface by the walls of the tube acting as a cathode, the discharge being thus separated from the walls by a dark cathode space.

2. The cathode rays leave the surface between the solid and the gas in the direction in which the oscillatory discharge is penetrating that surface. In air at atmospheric pressure the direction in which the oscillations leave a conductor is perpendicular to the surface of the conductor, so that if a metallic sphere is laid against the tube the cathode rays start perpendicular to the surface of the sphere. The angle of the cone only reaches a certain magnitude, owing to the distance between the sphere and the gas in the tube being too great beyond that angle. This critical distance is attained at a smaller angle the greater the curvature of the sphere. If the metal is surrounded by rarefied gas, as is the case with internal electrodes, then the dark space influences the direction in which the oscillations leave the cathode and cause it to be no longer perpendicular to the surface.

Commercial Tests of Accumulators. E. Hospitalier—In testing storage-cells for capacity and efficiency, there are three different methods of procedure, each giving different results. First, the cells may be discharged through a constant resistance. Second, the current may be kept constant; and, third, the power taken from the cells may be kept constant. Of these methods the first is the simplest and leads to the best results. The discharge should in all cases be continued till the electro-motive force (on open circuit) of the cell falls to 1.8 volts. The author thinks that there should be uniformity of method in commercial testing of storage-cells so as to render a comparison of their respective merits possible.

SPECIAL NOTES.

M. E. Branly has presented a memoir to the Paris Academy of Sciences on the subject of telegraphing between ships at sea in order to prevent collisions. It is possible for one ship to send signals to another, but difficulty is experienced in returning the signal, because each ship must then be fitted with a transmitter as well as a receiver, and it is not easy, if possible, to screen the receiver from the effect of the transmitter.

Textiloid is the name given to the latest substitute for rubber, introduced by Eugene Cadaret, of Paris. It consists of resinoline and admixtures. The resinoline is said to be obtained by treating oil with three or four times its bulk of metallic carbonates, and then with nitric acid. Then follow saponification, precipitation by means of an acid, and dissolution in alcohol or ether. A hundred parts of resinoline are mixed with 20 of zinc, oxide of manganese, etc., and 60 parts of methylated spirits; after several hours the mass is kneaded for one hour or more, and finally compressed at a temperature of 80 or 90 degrees centigrade, under a pressure of 200 to 800 atmospheres.

Missouri & Kansas Telephone Dividend.

The Missouri & Kansas Telephone Company, under date of August 15, is paying its quarterly dividend of one and one-fourth per cent. This company has its headquarters in Kansas City and covers a very excellent territory, including Kansas, Oklahoma and the greater portion of Missouri The officers are Mr. J. R. Mulvane, president; Mr N. R. Ferguson, secretary; Mr. H. W. Bellard, treasurer, and Mr. Alonzo Burt, general manager.

How to Be Known.

A party who has been continuously advertising more than 30 years said to me recently: "I advertise to be *known*—to *keep* known. I employ salesmen to sell my goods. I do not want my representatives to enter a factory in California or Illinois, and on presenting his card be met with the query: 'I never heard of your house; how long have you been in business?' We recognize that publicity is capital, and we spend thousands of dollars to keep our house before the public, and our salesmen have a great advantage over rivals who do not see the value of publicity."—*Carriage Monthly, Philadelphia.*

Electric Railway at St. Thomas, Ontario.

United States Consul Burke writes from St. Thomas, Ont., as follows:

"The city of St. Thomas heretofore has had practically no street railway accommodations, there being in operation only about one and one-fourth miles of three-foot-gauge horse-car road. A new electric trolley system was completed on June 15. The road is a belt line, 6.1 miles in length, running around the city. With the exception of the overhead joints and fixtures, the line was built and equipped with Canadian material, the total cost being $85,000. The rails were made at Hamilton, Ont.; the engines at Amherst, N. S.; dynamos and electrical equipment were purchased of the Canadian General Electric Company, Toronto; and the motors—eight in number—and two trailers were manufactured by the Ottawa Car Company. The motors are the latest pattern double controllers, and cost $2,800 each. It is intended to extend the line to Port Stanley, 9 miles south, and possibly to London, 15 miles north."

Vacuum-Tube Luminosity.

In a recent communication to the *Physical Review*, Mr. E. S. Ferry discusses the relations between pressure, current and luminosity of the spectra of pure gases in vacuum tubes. The author describes his methods fully, and gives his results in a series of tables and curves, which lead to the following conclusions regarding the luminosity of the separate spectral lines of gases in vacuum tubes under different conditions of pressure and current strength: 1. With gas pressure of from 0.25 millimetre to 4.00 millimetres of mercury, and current strengths of from one milliampere to six milliamperes, the luminosity of the separate spectral lines of gases at a given pressure is directly proportional to the current strength. This is in exact parallelism with K. Angström's observation that the energy of the luminous radiation, as well as the total radiant energy of a gas rendered luminous by an electric current, is directly proportional to the current strength. 2. With constant current, the luminosity of a spectral line of a gas increases as the pressure decreases, at first slowly and then more rapidly. The curve showing the relation between the pressure of the gas and the luminosity of a spectral line is regular, but is different for different lines. The research work was performed in the Physical Institute of the University at Upsala, and in conclusion the author expresses his deep obligations and grateful thanks to Prof. Kunt Angström for the assistance and encouragement he received from him throughout the entire course of the experiments.

LITERARY.

Mr. George E. Graham and Mr. W. A. M. Goode will contribute to *McClure's Magazine* for September accounts of the destruction of Admiral Cervera's fleet as witnessed by themselves from Commodore Schley's flagship, the "Brooklyn," and Admiral Sampson's flagship, the "New York." They represented the Associated Press, and were the only correspondents aboard the American ships at the time of the battle with Cervera. The articles will be very fully illustrated, largely from photographs of the actual scene, taken by the authors. The illustrations will comprise portraits of all the commanders, Spanish as well as American; pictures of all the ships; views and diagrams of the battle in its successive stages; and views of the wrecks of the Spanish ships taken soon after the battle closed.

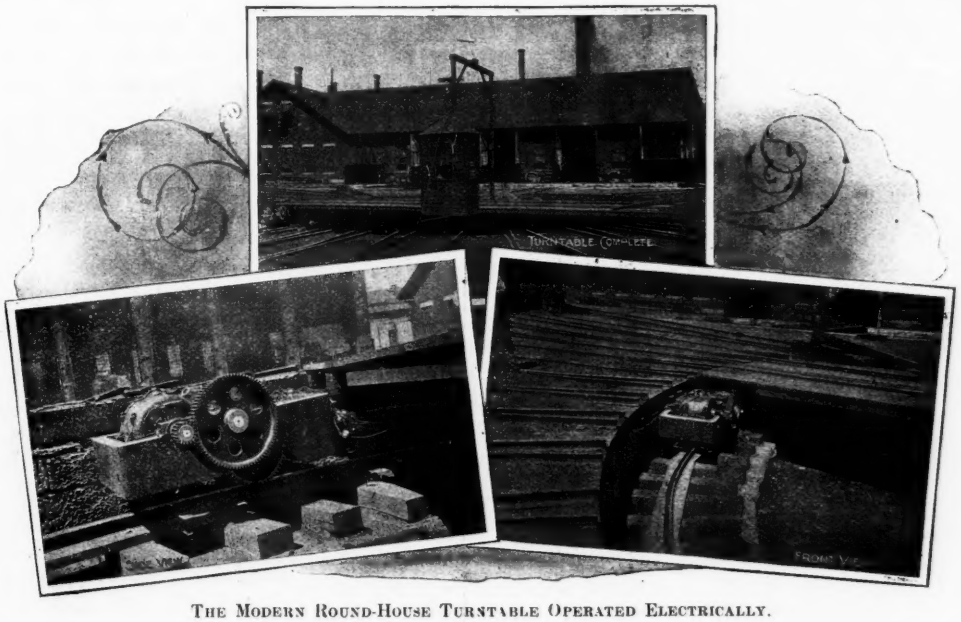
International Association for Testing Materials.

The executive committee of the American section of the International Association for Testing Materials at a meeting held at the Engineers' Club, July 30, 1898, selected Saturday, August 27, 1898, at the Engineers' Club, 1122 Girard street, Philadelphia, as the date and place of the first annual meeting of the American section of the International Association for Testing Materials.

The Modern Round-House Turntable.

The economics of railway management do not end with the adoption of the high-pressure compound locomotive, or the hundred other contrivances which have been born of necessity, but go on and on always finding a way to eliminate here or there an unnecessary expenditure.

The latest economic development is the adaptation of the electric motor to turntables, called the Westinghouse turntable "donkey." The simplicity of the device and the method of operating it is plainly evidenced in the illustrations herewith.



THE MODERN ROUND-HOUSE TURNTABLE OPERATED ELECTRICALLY.

It is the product of the Westinghouse Electric and Manufacturing Company and consists of their "series reversible" type "F" 10 horse-power motor, mounted within a heavy cast-iron frame, having a traction wheel which rests upon the rail of the turntable pit. Power is transmitted to this wheel through double reduction gears. The "donkey" frame is connected by draw-bar and pin to one end of the turntable at the side, sufficient traction for the driving wheel being secured through the weight of the machine, which is 3,700 pounds. Wires are run from the "donkey" to a small platform, located at one side of the center of the turntable or other convenient place, at which point is installed a controlling rheostat. By means of this controller the "donkey" may be operated in either direction at will by simply moving a single lever to one or the other side of a neutral point. Current which may be supplied from the shop lighting or other convenient circuits, and may be either alternating or direct and of any standard voltage, is supplied by wires brought to a suitable contact overhead and then led to the controller.

As no changes in the turntable are required for installing the turntable "donkey," the connections between the frame of the latter and the turntable girder being very simple, the cost of installation is low. As compared with the steam-operated turntable it is apparent, even to the layman, that electrical power has the advantage, as it is a well recognized fact that the small portable boiler and engines are extremely wasteful of fuel, besides being a source of danger and requiring constant expert attention.

The comparison with turntables operated by push poles is no less interesting. In one of the installations, located at an important division point, it was necessary to turn 176 engines each 24 hours, or about seven per hour. Previous to installing this "donkey," push poles were used, requiring the services of four men, and the operation was a slow one at best. Now, one man does the work in a much shorter time. With the turntable "light," the "donkey" will make a complete revolution in 30 seconds, while with a 10-wheel locomotive on the table, weighing, with tender, 100 tons, a complete revolution is made in 45 seconds. We therefore have the following summary:

Engines turned per day	176
Men required	4
Average time, each man	5 minutes
Total time, per engine (5 minutes by 4 men)	20 "
Total time for 176 engines	59 hours
" " " 176 " with electric donkey	24 "
Time saved	35 "
35 hours at 12½ cents, amount saved per day	$4.37

The above calculations assume that the men are employed in wiping engines while not employed in operating turntable; otherwise the comparison would be still more favorable to electrical operation.

The assumption of five minutes per man on the average is conservative. It is plain that the 35 hours saved would supply two day and two night men as wipers on shifts of eight hours each.

It is stated that actual tests have shown that the power consumed by the electric "donkey" is the equivalent of one-half horse power per hour. Assuming six pounds of coal per horse-power with coal at $2 per ton, the cost of turning each locomotive would be three-tenths of a cent, or 53 cents for 176 locomotives.

Electrical Review

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SPECIAL NOTICE TO ADVERTISERS.

CHANGES for advertisements must be in this office by Friday noon for the following week's issue. NEW ADVERTISEMENTS should be in the office not later than Saturday noon to insure publication the following week.

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The fiftieth annual meeting of the American Association for the Advancement of Science is in session this week at Boston. A large attendance of prominent scientists is present, and the semi-centenary of the association is being fittingly celebrated.

THE TROLLEY IN NEW YORK.

On Saturday last all the underground work on the conduit trolley road in Sixth avenue, New York city, from Fourteenth to Twenty third street, was finished about a month ahead of the time specified by the Metropolitan Street Railway Company when it began the work. The merchants in that part of the town raised many complaints when the horse-car service was discontinued, pending the new installation, and President Vreeland has apparently done everything in his power to hurry the work. The following from the New York *Evening Sun* of Thursday last contains high and well-merited praise, which should be very pleasing to President Vreeland and his able assistants:

The rapidity with which the work of constructing the electric trolley road on Sixth avenue has been carried on is as remarkable as it is gratifying to the merchants of that thoroughfare. The announcement by the company that a section of the new road will be in operation on Saturday, and that the cars will be run free on that day, will be hailed with delight by the thrifty shoppers, who may be depended upon to invest over the bargain counter the nimble nickels thus saved. The section of the road to be opened is short—from Fourteenth to Twenty-third street—but it is in the heart of the shopping district, and, therefore, largely patronized throughout the midday hours, when the through traffic is lightest on the elevated roads. Already the avenue, in the parts where the new roadbed is completed, presents a handsome appearance, and the withdrawal of the old motive power will materially lessen the dirt accumulations and the dust which have long been annoyances to merchants and shoppers alike. It is a pity that the city does not find it expedient to pave the street with asphalt while the railroad company's work is in progress, but the change of motive power is so great an improvement that there will not be much, if any, grumbling because of the present retention of the granite blocks. The retirement of the car horses will do much to lessen the noise, and we can afford to wait a while longer for the asphalt and the quiet which it effects.

KEEP THE PHILIPPINES!

The retention of our new possessions outside of our immediate boundaries will, of course, result in the necessity for a colonial policy, something radically new in our scheme of government; but the American people are equal to it. Aside from strategic or diplomatic reasons, we should hold the Philippine Islands as one of our possessions for commercial reasons. On June 29 the ELECTRICAL REVIEW published an interview with Mr. L. D. Hilles, of the well known electrical firm of Bagnall & Hilles, of Yokohama, Singapore and Manila. At that time Mr Hilles said:

"Those islands should by all means remain in the possession of the United States. Their commercial possibilities and native resources are almost unbounded. The sharpest competitors of the Americans and the Englishmen doing business there are the Germans. * * * There is a wonderful chance for Americans in many industrial undertakings in the Philippines, and I hope our government will hang on to them."

The firm of Bagnall & Hilles is the oldest American electrical house doing business in the far East, and Mr. Hilles speaks with an authority born of experience. We trust that such convincing testimony will carry its due weight. Keep the Philippines!

Preparations for the convention of the American Street Railway Association, which will be held at Boston, September 6 to 9 inclusive, are practically completed, and a comprehensive exhibit of electric railway appliances and appurtenances seems assured. There is a great deal to interest street railway men in Boston, and a large attendance is expected. Boston was the first of our large cities to install an electric railway system of any considerable extent, and it was there that the first practical experiments with the underground conduit system were tried. Many of our readers will remember the old Bentley-Knight system as installed on Boylston street. Then there is the great subway which has done so much to relieve the congestion of cars on Tremont and other streets, and it is understood that the convention will be entertained and instructed by a description of the new elevated railway which is to be operated electrically.

Last week we illustrated and described briefly the searchlight captured from the Spanish cruiser "Viscaya" and now installed on the U. S. S. "Texas" in place of one shattered by the concussion of her own guns. For the information and possible interest of the makers of the "Viscaya" searchlight we may state that the name-plate is inscribed "Sautter, Harle et Cie, 1893, No. 968." The projector is marked "Mangin, No. 1737." We can also assure the manufacturers that this searchlight is highly prized by the officers and men of the "Texas," and that it will have the best of care and attention.

The "deadly trolley," as might be expected, is getting its usual share of attention from the sensational newspapers during the silly season. The latest is that the electric cars crossing the Brooklyn Bridge are going to break it down. Colonel Roebling says the Bridge is as good as the day it was built, but that doesn't matter to the sensation mongers. We notice, however, that people are still riding and walking unconcernedly across the great structure.

When that $15,000,000 is finally spent New York city will have the finest street railway system in the world, and all underground at that. As Manhattaners are great people to celebrate things, wouldn't it be a good idea to "take time by the fetlock" and arrange befitting ceremonies to usher into permanent oblivion the last street-car horse?

We are requested by several manufacturers to announce that the usual amount of snow, ice and low temperature may be expected with reasonable certainty during the Winter of 1898–9, and that now is a good time for the electric railway fraternity to begin to consider what will be needed in the way of snow-plows and electric heaters.

Chicago is considering the adoption of the message rates for its telephone service. We wonder if this will be construed as an effort on the part of the "telephone monopoly" to control the conversational qualities of our enterprising western city?

General Electric Company's Capital Stock Reduced.

With the idea of getting the most authentic and official information as to the recent capitalization moves by the General Electric Company, a representative of the ELECTRICAL REVIEW called on President Coffin in his New York office, and was told that the following summary of the situation was practically correct:

The reduction of the capitalization of the General Electric Company was effected, August 17, at the adjourned stockholders' meeting in Schenectady with but little opposition.

Mr. T. Jefferson Coolidge, seconded by Mr. Phelan, made the motion of the day in the form of a resolution, declaring that the capital stock of the General Electric Company be reduced from the present amount to $20,827,200, which shall consist of 182,760 shares of common stock, par value $100, and 25,512 shares of preferred stock, par value $100, the now existing common and preferred stock and the number of shares of each holder being respectively reduced to three-fifths of the present amounts.

Mr. W. L. Putnam, representing the minority preferred stock, moved to adjourn and await the result of Livermore's litigation. The motion was put to a stock vote and lost, 243,141 to 9,800. Mr. Putnam also attempted to have a committee appointed to appraise the true valuation of the property, but Messrs. Coolidge and Ames affirmed their reliance on the board of directors, who had carefully considered the matter, and this amendment was also lost.

Mr. Putnam protested that the vote was illegal, for four reasons: First, because the charter did not authorize the reduction; second, because such reduction would practically take 40 per cent from the value of the preferred stock and give it to the common stock; third, because the common shares had been largely overissued and had remained unpaid; fourth, because there was no sufficient justification for reduction on any grounds whatever. Finding that the tide of the reduction movement was too strong to be resisted, Mr. Putnam finally succumbed with a last attempt to have the vote declared void.

President Coffin overruled all these objections. The sworn tellers made their report through Mr. Darling, their chief. President Coffin declared that 243,141 votes were cast in favor of reduction and only 9,800 against it, and about $20,000,000 of excessive valuation (not value) were swept away in a moment.

A Heroic Rescue From Drowning.

Edwin Lowe, Jr., son of a Providence, R. I., alderman, saved four persons from drowning on August 14 at Matunuck Beach, near Providence. Among those saved was Miss Grace E. White, daughter of councilman Albert C. White, general manager of the Providence Telephone Company. Miss White and three others were carried out beyond their depth by the strong undertow, and were nearly exhausted when Mr. Lowe, who was one-fourth of a mile away, heard their cries. With quickness and great presence of mind he managed to save all four. Miss White was sinking for the second time when Mr. Lowe reached her. Mr. White, in the meantime, had swam out toward his daughter, and Mr. Lowe, after getting her beyond the undertow, turned her over to her father, and both were brought ashore with a rope.

Wall Street and the Electrical Stock Market.

Toward the end of July a general advance in the stock market set in, which reached a temporary culmination in the tremendous dealings of Wednesday and Thursday of this week. Speculation raged with a violence which astonished the oldest operators. The comparatively small reaction that took place is an evidence of the confidence generally felt in the financial outlook. On the New York Stock Exchange, General Electric closed on Friday of this week at 41⅛, as against 41 on Saturday last. This price is within seven-eighths of a point of the highest that General Electric has reached during the year. Western Union closed on Friday at 95 as against 94 on Saturday last.

Wall Street, August 20.

Cable Censorship Lifted.

General Greely, chief signal officer of the army, announces that the censorship has been raised on all dispatches except press dispatches sent over the cables under the control of the United States leading from ports in Cuba and Porto Rico. Messages of all kinds, including commercial and Spanish official dispatches alike, will be allowed to pass without scrutiny.

The Commercial Cable Company is advised that the censorship is raised on all commercial, code or cipher messages to Cuba. Porto Rico and all West India islands.

Prof. W. Le Conte Stevens, of the Rensselaer Polytechnic Institute, has accepted the chair of physics in Washington and Lee University.

THE CHICAGO & MILWAUKEE ELECTRIC RAILWAY.

(Concluded from page 115.)

mitted to the sub station it is necessary to raise its potential from 380 volts to 5,500 volts. This is accomplished by means of static transformers placed in the basement, as shown in Fig. 3. The transformers are cooled by a blast fan operated by a one-horse-power induction motor. Generator No. 3 is to be a duplicate of generator No. 1.

The engines and generators are connected by means of the "Arnold system." This system has been adopted by so many power stations that the details of the connections it involves have become familiar. Each generator is mounted on a quill or hollow shaft Suitable couplings connect this solid shaft with either of the engine shafts or the generator quills in such a manner that each generator can be operated by more than one engine. Thus, engine No. 1 can run either or both generators No. 1 and No. 2, while engine No. 2 can be used to drive four generators when they are eventually installed. In case of a breakdown to any engine the other engines in the plant can be made to carry an increase of load by the method already described. This system, then, insures the same reliability that is usually secured by investing in a reserve unit, but by means of a much less original investment. This system is also particularly adapted to a station of this character, containing, as it does, two different types of generators. When the load is light the road may be operated from the alternating-current, direct-current generator, and is always available from two engines. In case of a breakdown of one engine, this generator may be connected to the other engine. To secure this same reliability with the ordinary direct-connected, independent-unit station, another engine and generator unit would have been necessary, as in such a plant an accident to an engine cripples the entire unit.

As the demand for the current varies, the load may be transferred from one engine to another, or all engines may be operated in unison, which is important when working alternating generators in parallel. As each generator is mounted on independent bearings, it is possible, if occasion should arise, to operate generator No. 2 as a rotary converter, or even to connect generators Nos. 1 and 2, so that they could be used in the same manner.

The plan for the sub-station is shown in Fig. 4. These sub-stations are to contain the static step-down transformers, the rotary converter and a storage battery. It will be noticed that the electrical equipment of the sub-stations is not in duplicate. This has been considered unnecessary, as it is intended to mount the machinery needed for a sub-station, static step-down transformers and one rotary converter upon a truck fitted with motors. In case of breakdown at any sub-station, the battery can be relied on to supply current for several hours, during which time the portable reserve sub-station equipment can propel itself to the crippled station and connected ready to operate until the repairs have been made.

The storage battery in a sub-station of this character has many advantages. It supplies all the sudden and excessive demands for current, due to the fluctuating load, peculiar to a road of this kind, operating few and heavy trains. The rotary converter can be made to carry a fairly average load, and in turn the generating machinery at the power-house can be operated under constant conditions of load. This feature of steady load can not fail to contribute to the fuel economy of the generating station. As the station is relieved of the necessity of supplying the occasional maximum load by the ability of the sub-station batteries to respond for short periods to an excessive demand, machinery of much less capacity is required in the power-house than if the batteries were not used. A correspondingly reduced investment is required in transmission lines and rotary converters. To these advantages may be added one more, which is peculiar to the alternating, direct-current system of distribution. The effect of the self-induction of the alternating-current motors in the sub-stations compels considerations of "leading" and "lagging" currents, which may become extremely troublesome. The best condition for operating is when the power factor of the circuit is unity; that is, when the apparent energy is equal to the real energy. The strength of the motor field can be adjusted at any given load so as to neutralize the inductance of the line, and leave the current nearly in phase with the electro-motive force. If the motor can operate at or near this given load, the power factor will not depart far from unity, and the circuit will act like a continuous-current line. If the load varies, however, to any great extent, the resulting "false current" may compel the transmission over the lines of a current greater than that really required to operate the motor. The storage battery, by furnishing a reservoir to which energy may be given or from which energy may be taken as the load varies, enables the rotary converter to carry a practically steady load, and thus the accumulator contributes much toward maintaining an electrical balance in the alternating-current circuits. As the road is extended and the traffic becomes heavier, the conditions of the service will probably make the installation of a battery at the main power-house a desirable investment.

The original projectors of this line were C. E. Loss & Company, who were also the contractors and builders. The Chicago & Milwaukee Electric Railway Company was organized to purchase and operate this property. The officers are as follows: G. A. Ball, president; A. C. Frost, vice-president and treasurer; Geo. M. Seward, secretary and auditor, and R. S. Ives, general superintendent.

A GREAT ADVANCE IN FIRE-ALARM TELEGRAPH PROTECTION.

READ BEFORE THE ASSOCIATION OF FIRE AND POLICE TELEGRAPH SUPERINTENDENTS AND MUNICIPAL ELECTRICIANS, ELMIRA, N. Y., AUGUST 10, 1898, BY J. W. AYDON.

I desire to present to the convention a brief description of a most important and recent advance in methods of fire-alarm protection, which will make the outbreak of a fire and the sounding of the alarm through the municipal system practically simultaneous.

Nothing further than this preliminary statement is necessary to command the attention of this convention, made up, as it is, of men whose experience teaches them that the smallest space of time lost between the discovery of a fire and the giving of an alarm may often result in serious loss of life and property, and add immensely to the dangers and difficulties which fire departments have to contend with in the performance of their duty.

I refer particularly to a combination with the well known Gamewell auxiliary fire-alarm system and the cable of the Montauk Multiphase Cable Company, which combination makes the Gamewell auxiliary system automatic as well as manual.

The auxiliary system proper was an immense step forward in this vital matter of minimizing the time between the discovery of a fire and the giving of an alarm, and its record throughout the country for the past six years has been a most excellent one. During this time it has been in quite extensive use in many of the large cities of the United States, and in those places has been a considerable factor in reducing the fire losses, and has been a material aid to the fire departments.

In the city of Wilmington, Del., it has rendered exceptional service to property holders and to the department, and has been the means of preventing several serious fires by enabling the fire department to reach the scene of the fire some minutes sooner than would have been the case otherwise.

The auxiliary system in effect brought the nearest public fire-alarm box into the interiors of buildings, and placed it at any desired number of points, by providing a series of small, auxiliary boxes from any one of which the street box could be instantly operated, by the pulling down of a lever contained in each auxiliary box. But the system being purely manual was not effective when the protected premises were vacant; and it was to cover this point that the method of rendering the auxiliary system automatic as well as manual was perfected.

The great value of an automatic connection with municipal fire departments has been long recognized, and for many years received the hearty co-operation and encouragement of insurance underwriters and fire department officials; and, under the fostering influences of these interests, the automatic fire-alarm business has grown to large proportions and has rendered, and is rendering, most valuable service.

The growth of the automatic system, however, has necessarily been confined to a few of the largest cities, for the reason that it is necessary to maintain the system in connection with its own central office, through which alarms of fire have to be transmitted to the fire department. The expense of wiring and the cost of maintaining a central office equipment is so great that the business can not be made a commercial success except in the largest cities.

For smaller cities, where the amount of property to be protected is not so large, but relatively equally valuable, the automatic system is not available; but the record of this system, covering a period of many years, has conclusively proved that a reliable automatic system, available wherever there is a fire department, is of vast importance.

The successful operation of an automatic system in smaller places is now, for the first time in the history of the fire telegraph, possible. It has never been a matter of electrical or mechanical difficulty to connect ordinary thermostats into an auxiliary system, so that an excess of heat would automatically operate the street box, but the danger of unnecessary alarms has prohibited this.

The recent invention of the Montauk "multiphase" cable, referred to above, has been adapted for use in connection with the auxiliary system, so that it becomes automatic as well as manual, without the sacrifice of any of the peculiar features of safety from false alarms, which is the foundation of the willingness of fire departments to allow its use in connection with street boxes.

This "multiphase" cable is of peculiar construction, as will be noted from the drawings which I have for your examination. Briefly, it consists of a copper conductor having a fusible metal covering, with insulating material over it, around which is wound a series of small copper wires, the whole being again protected by a slow-burning insulation. This cable is wired into the auxiliary system in the place of the ordinary wire heretofore used, and in connection therewith is run a single wire composed of fusible metal only, and protected with a free-burning insulation.

An automatic auxiliary equipment would, therefore, consist of the desired number of auxiliary boxes, distributed throughout a building at convenient locations, connected through the usual testing apparatus with the nearest street fire-alarm box. The interior wiring of the equipment would be of this "multiphase" cable described, and the single fusible wire mentioned, the cable and single wire being run parallel to each other.

As fires do not start upon the ceilings of rooms (where the ordinary thermostats are placed), the automatic wires referred to would be run around base boards, back of benches, through closets, under staircases, etc; in fact, so as to cover every danger point where a fire would be likely to start. These danger points can be scientifically located for each class of risk, by reference to insurance tables giving the accumulated experience of all of the insurance companies for a period of years, as well as by individual judgment in each case.

It will therefore be seen that such an equipment would provide a number of auxiliary stations, which, when manually operated, would instantly set the street box in motion, thereby giving the alarm to the fire department, and would also provide for the covering of all danger points in the building by an automatic cable as indicated.

There is no necessity of describing the operations of the auxiliary system proper; i. e., when operated manually; so we will pass to the working of the "multiphase" cable when it comes in contact with actual flame.

First, however, let me call the attention of the convention to the fact that it takes actual flame, or a temperature of 360 degrees without flame, to cause this wire to send in an alarm, and this, therefore, prevents false alarms from an overheating of a building, which might not necessarily be dangerous.

This failure to act until flame comes in contact with the wire, or until a temperature of 360 degrees is reached, does not imply that the wire will not give the alarm for an actual fire as quickly as a thermostatic equipment would do. On the contrary, it would doubtless in most cases give it quicker, for the reason that every fractional part of an inch of the wiring of an auxiliary system would be an alarm-giving point, located where the fire would probably start, instead of being away up on the ceiling, perhaps many feet away from the fire.

The fact that this cable requires flame, or a temperature of 360 degrees to operate it, insures it against any liability to false alarms, for conditions producing a temperature at which thermostats act unnecessarily produce no effect upon it.

Returning now to the operation of the wiring of an auxiliary system equipped with the "multiphase" cable, under the influence of flame or 360 degrees of heat, the single fusible wire melts open, and the fusible metal covering of the inner wire in the cable melts, and forcing its way through the insulation makes a solid soldered connection with the series of copper wires described.

This action of the wire produces a condition in the auxiliary system exactly the same as that brought about by the manual pulling of one of the auxiliary boxes, and the alarm through the street box is the immediate result.

This combined system, like the auxiliary system proper, is at all times under automatic test, so that any line or battery disarrangement will be instantly made known. This system combines all of the advantages of an automatic system with all those of an auxiliary system, without any of the disadvantages of the former. It is available wherever there is a street box, in a large city or a small town.

To sum up briefly, the automatic auxiliary system enables the instant and manual sending of an alarm of fire, and also provides that every fractional part of an inch of its wiring shall be an untiring watchman, ready at all times to instantly give the alarm when fire makes its appearance.

I think the convention will agree with me, that in providing means for an incipient fire to send in its own alarm, a most notable forward step has been taken in that branch of municipal service to which we are devoting our lives.

The Telephone and Cable Station at Camp McCalla.

Russell Howland, of the ELECTRICAL REVIEW staff, who is serving as an able seaman of the New York Naval Militia, on board the auxiliary cruiser "Yankee," writes as follows from Guantanamo Bay:

"I went ashore at Camp McCalla the other day and naturally drifted into the cable and telephone tent. The tent is situated within 50 feet of the beach and is shaded by a couple of lofty palms. It seems rather peculiar to find a telephone station dropped, as it were, in the midst of the wilderness with nothing around but scraggy mountains and bloodthirsty Spaniards.

"Within the tent was a completely equipped station, having telephone connections with Siboney and cable connections with Santiago and Baiquiri, and recently a telephone has been added besides the cable. The Bell telephone is used throughout the line, which is fed by 'O. K.' and 'Mascot' dry batteries, from which service much satisfaction has been derived, according to the statement of the operator. On lines of this sort, where important messages are continually being sent back and forth and where one mistake or defect might cause serious complications, great care has to be taken to provide competent operators and instruments, and though seemingly the connections were roughly made, yet everything to the minutest detail was carefully put together and tested. Since the establishment of the station the same set of batteries has been used, and during that time the strength of the batteries has not lost the fraction of an ampere."

The Effect of Telegraph Work on the Health.

[*From the Lancet, London.*]

In a paper read before a meeting of railway telegraph clerks in Manchester, on March 26, Mr. J. T. Hull, president of the Railway Telegraph Clerks' Association, gave so unfavorable an account of telegraph work in relation to the health of the operators that he not only described it as being responsible for many bodily ailments, but said that there was an extreme probability of its "being the most deleterious in its effects upon the operator of any trade or profession hitherto regarded as dangerous." Telegraphy, he said, is essentially a mental action, involving principally the auditory nerves. The development of this faculty in a proficient telegraphist may be approximately ascertained by a simple calculation. In ordinary working—that is, reading 20 words per minute, the operator distinguishes about 150 alternations of pitch (on the needle) or duration of beats (on the sounder) and under pressure it is said that as many as 450 may be accomplished. In telegraphy there is also the translation of the auditory symbols into visual symbols—i. e., the writing, which implies mental exertion. While normally 120 discriminations per minute may be made of varying sensations, the telegraphist never does less than 150, and may do 450 per minute. Without taking the extreme cases, it may, therefore, be safely asserted that the auditory faculties of telegraphists are about two and one half times as sensitive as those of ordinary persons. In telegraphy it is the uninterrupted continuance of nerve stimulation, the monotony of sound, and the fixity of attention which are injurious, the work being pre-eminently the reception and mental arrangement of monotonous sounds and demanding close and arduous attention. That this condition of concentrated attention is most acutely enervating is the unanimous testimony of all physiologists. During a pressure of work the interference with normal respiration, the increased action of the heart, and the rush of blood to the head may be readily observed.

These effects are most noticeable during a spell of rapid sending and are probably due to the physical movements making the attentive effort more onerous. The prevalence of phthisis among telegraphists is clearly shown in the following tables taken from the evidence given by Mr. Garland before the Royal Commission appointed to inquire into the grievances of the post office employés:

TABLE A.

Showing comparative percentage of mortality from respiratory diseases, with deaths after fifty-five years of age excluded.

	Phthisis.	Other respiratory diseases.	All respiratory diseases.
All adult males.....	13.8	10.6	24.4
Telegraphists.....	46.6	12.9	59.5
Grinders (cutlery)...	33.1	24.2	57.3

TABLE B.

Showing comparative percentage of mortality from respiratory diseases, all ages from 15 up to 65.

Ages.	All males.	Telegraphists.	Grinders.
15 to 25.....	3.5	18.4	4.3
25 to 35.....	4.9	23.1	8.3
35 to 45.....	5.3	12.0	13.6
45 o 55.....	5.3	4.3	17.7
55 to 65	5.4	0.5	13.4
Over 65.....	8.2	0 5	6.7
All ages	32.6	58 8	64.0

Mr. Hull further said that he suspected that many telegraphists suffered from a modified form of chorea, consisting of a twitching of the fingers in accordance with the telegraphic symbols of the alphabet.

General Electric Company's New Machine Shop.

Work on the machine shop of the General Electric Company, at Schenectady, N. Y., was begun last week, when ground was broken for what will be a most important addition to the great manufacturing facilities of that company. The contracts were let last week to A. & R. Roberts, of the Pencoyd Iron Works, Philadelphia, for the steel construction, and to J. J. Turner, of Amsterdam, N.Y., for the masonry, etc. The cost of the new building is estimated at $175,000.

The new machine shop will face on the Central avenue, opposite building No. 15. It will be 653 feet long and 166 feet wide, and will be divided into three aisles, the central one having a width of 65 feet, the side aisles being each about 50 feet wide. The total floor space of this building will be not less than 144,250 square feet. It will contain the machinery necessary to handle the very large apparatus which the requirements of modern practice have rendered necessary.

The need of such an addition to the manufacturing facilities of the General Electric Company is realized after a visit to the factory at Schenectady at the present time.

The many orders both for large machinery and for large quantities of apparatus are severely taxing their facilities, and such has been the rush of orders that the traveler on the New York Central Railroad, as he passes the town at night, sees at least half of the buildings lighted up and filled with employés busily engaged in pushing forward to completion the orders in hand. The working of night shifts has been carried on since the beginning of the year, and, according to the superintendent, there are few signs of the practice being abandoned for the present. It is expected that the new machine shop will be completed before the end of this year. The machinery will be driven by the current transmitted from Mechanicville, 17 miles distant.

In addition to the new machine shop the General Electric Company is making several important extensions to other buildings. The new foundry, which was recently begun, is now in position to receive the ironwork, the support for the great traveling crane having been erected last week. This building, when finished, will contain the largest foundry under one roof in the world.

Mineral Oils As Scale Preventives.

[*From the Locomotive.*]

Crude petroleum, and the products obtained from it, have been successfully employed for removing scale from steam boilers, and the use of the oil itself, or of some of its derivatives, is frequently recommended by our inspectors in certain localities where the quality of the water is such as to indicate that good results would follow. Its advocates claim that it is a sort of universal panacea for boiler ills, but with this we can not agree. In fact, we believe that the scale preventive that is to be used in a boiler should receive the most careful attention, and should be selected with especial reference to the conditions under which the boiler is run. Petroleum derivatives, however, are certainly valuable in many places, and it is our purpose, in the present article, to give some information concerning their nature and action, and the best way of using them.

Oil, unlike most other substances used for the prevention and removal of scale, does not act chemically. It does not dissolve nor destroy the scale. It modifies the form in which new scale matter is deposited, and causes old scale to flake off copiously, and fall to the bottom of the shell.

It is of the utmost importance, whenever scale preventives are used in a boiler that is already scaled to a considerable extent, that the boiler should be systematically opened and cleaned at frequent intervals. This is particularly true when oil is the medium used; and if this precaution is overlooked or neglected, the scale that flakes off will lodge on the tubes and shell so as to prevent the free access of water to the iron, and the result will almost certainly be that the tubes will be burned and bent and the sheets overheated and bulged. This danger must be borne in mind constantly, whenever a heavily-scaled boiler is treated with a compound that acts quickly.

Crude petroleum is sometimes called "rock oil," and sometimes "well oil." It varies considerably in composition, and the lighter oils are best adapted for use in boilers, since the heavier kinds, when used in the crude state, contain asphalt and other objectionable substances in considerable amounts. When crude petroleum is used for the prevention or removal of scale, it is of the highest importance that it should be pure "well oil;" for the crude oil is often mixed with tallow or some other similar grease, to form a heavy-bodied oil for lubricating car journals and other bearings that are subjected to great pressure. Oil thus modified retains the peculiar color and pungent odor of crude petroleum, so that it is likely to be confounded with it. The introduction of tallow into the boiler in this way would cause great trouble, and would almost certainly ruin the boiler if the practice were continued for any length of time, owing to the tallow coating the plates and forming a sludge with fragments of loose scale, which would keep the plates out of contact with the water, and cause them to become burned or bulged. The lighter oils having a density of from 38 degrees to 45 degrees Baumé are the best adapted, of the crude oils, for use as scale preventives. Owing to the difference in crude oils, and the danger of getting a mixed or "sophisticated" oil when burning unrefined petroleum in small quantities, engineers and manufacturers find kerosene to be quite satisfactory as a substitute. Kerosene is nearly or quite as effective, and as it is almost entirely free from asphalt and the heavier paraffins, it can not combine with the sediment nor form oily deposits on the heating surfaces.

Dr. Ichisuka Fujioka, the local honorary secretary for Japan of the British Institution of Electrical Engineers, and consulting engineer to many Japanese electrical projects, is visiting England to investigate the position of the British electrical industries.

RECENT DEVELOPMENTS IN THE APPLICATIONS OF STORAGE BATTERIES.

ABSTRACT OF A PAPER READ BEFORE THE ENGINEERS' CLUB, PHILADELPHIA, JUNE 4, 1898, BY JOSEPH APPLETON.

In the history of the electrical industry in the United States there is probably no branch which has shown such a rapid growth as in the case of the storage battery during the last three years. The following figures show the enormous increase during this time; they have been carefully compiled and represent the actual weight of storage-battery plates installed. The weight is that of plates alone, and does not include containing-cells, acid, etc.

1894.....	349,000	pounds
1895.....	1,112,800	"
1896.....	2,315,300	"
1897.....	3,607,300	"

or ten times the business of 1894.

It will be readily seen that, in order to create such a growing demand, new applications must be constantly developed, and it is to some of the most important and interesting of these that your attention is invited.

Only a few years ago, if an electrical engineer recommended the use of a storage battery, he was immediately put down as a "crank," and one to whom it would be unwise to intrust any important engineering problem, but now it is the exception to find an engineer who will not consider the use of a storage battery as an auxiliary in all cases of generation and transmission of electrical energy.

One of the most important of recent applications of storage batteries is in connection with the development of "water-powers" for the generation, transmission and distribution of electrical energy for power, lighting and manufacturing purposes. It is well known that the demand for electrical energy in any district, whether in the form of power or light, is a variable one. At certain hours of the day the load is small, while at others, and usually for short periods, the load is great. This variation is always more marked in the Winter months than in the Summer. Quite recently I was discussing the use of batteries for loads of this nature with the engineers of one of the largest electric light and power companies in the country, and they made the statement that 50 per cent of their investment, in generating plant and underground copper, was only used for 154 hours during the year. No doubt, at first, this seems an astonishing statement to many of you, but I will venture to say that it is the condition which exists in many, if not the majority, of such plants in operation to-day.

To operate such a load from water-power means that only a small portion of the total power can be utilized. In the West, where there are enormous water-powers available, this is especially the case, for it is impossible to dam up the water, even where feasible, on account of the irrigation rights, which have a first claim on the water and which require a constant flow. By using a storage battery as an auxiliary to the generating machinery a much more regular load can be kept on same, as, no matter whether the fluctuations are rapid, as in a railway or power load, or occur at stated periods in 24 hours, as in a lightning load, the battery will store up energy when the demand is below the average and discharge when it is above the average, keeping the load on generators and water-wheel fairly constant. Furthermore, it is only necessary to install machinery for the average load, instead of the maximum, thereby saving a large amount in investment, as in plants of this description the average load is frequently but 30 or 40 per cent of the maximum, and, while the maximum only occurs for a very short period, sufficient generating machinery has to be provided to meet it When electrical energy is furnished for manufacturing purposes, in addition to the fluctuating character of the load, there remains the fact that the majority of mills run only 10 or 12 hours a day.

The modern office building, with its 15 or 20 stories, together with the demand for quick elevator service, has greatly increased the use of high-speed electric elevators. The nature of the work the elevator has to perform, and the fact that the power required to start it is from two to three times the hoisting power, makes an elevator load an extremely fluctuating one, no matter how carefully their operation is watched.

I have a curve plotted from observations taken every five seconds for 20 minutes, from a plant operating six high-speed "Sprague" elevators. The maximum elevator load recorded during that period was 800 amperes, and at times the load dropped to zero, all the elevators being stationary. This represents a maximum load of 140 horse-power, while the average is about 60 horse-power.

In this system of operating both elevators and lights from the same dynamos, the elevators are connected directly across the terminals of the battery, and the battery is charged from the dynamos through a constant current booster, which will allow only a certain predetermined current to pass from the dynamos to the battery and elevator circuits.

In this case the charging current is 250 amperes. The proper charging current is determined by ascertaining the average elevator load and adding to it 10 or 15 per cent for loss in the battery. When the battery is also used for supplying current at night after the generating plant has been shut down, the charging current should be increased sufficiently to replace the amount taken out of the battery at night, so that the battery will be fully charged by the end of the day run and ready to take the night load. Analyzing the load-curve more fully, it is noted that, when no elevators are running, all the current from the booster goes into the battery, but when the elevators start this current is diverted from the battery to the elevators, and is supplemented by the discharge from the battery. When the battery discharges, of course its voltage is lower than when charging, and there would be a tendency for a larger current to pass from the dynamo through the booster unless this machine were wound to maintain a constant current. One line shows the current being delivered by the dynamo, and it will be noticed that the extreme variation in the load only amounts to 50 amperes, or eight horse-power, with a variation of 140 horse-power in the elevator circuit. Another line shows the voltage on the dynamo terminals, which varies two volts, or less than two per cent.

In the plant in question only one dynamo is run for both elevators and light, until the peak of the lighting load comes on, when more generators are run in parallel with the first; but at no time are the elevators and lights run from separate dynamos. At night the battery takes care of the lights in the building and 30 or 40 trips of one elevator.

To summarize, the advantages of this system are:

Smaller generating plant necessary.

Only one unit need be run, instead of two, with consequent saving in labor.

Greater economy of operation, due to plant being run at a constant and efficient load instead of a varying one.

Smaller depreciation on plant, due to entire absence of heavy loads being suddenly thrown on same.

Greater reliability on account of battery being ready to take entire load in case of emergency.

The general adoption of electrical elevators has been retarded by the fact that it was considered necessary to operate them from a separate dynamo from that which was supplying the lights, or, on the other hand, to sacrifice the steadiness of the lamps if they were both run from the same dynamo; but with this system this trouble is entirely overcome, and there is now no reason to complicate the electric plant in any building by adding hydraulic machinery. This system is applicable in exactly the same way to large buildings operating electric elevators from electric lighting mains. Frequently electric lighting companies will refuse to connect electric elevators to their system, especially at a distance from their stations, on account of the disturbing effect on their pressure; but with this system only a constant load, equal to the average demand of the elevators, is taken from the system, the battery taking care of all fluctuations.

The storage battery plant recently installed for the Chicago Edison company is interesting, chiefly on account of its magnitude. For years it has been customary to refer to European practice for examples of storage battery applications, but lately this has been unnecessary, as we have many plants here equal to anything on the other side. Now we can point with satisfaction to the installation in Chicago, which is 50 per cent larger than any battery in the world.

The question of electric vehicles is, to the general public, probably the most interesting among recent applications of electricity, and the field it opens up for storage batteries is almost beyond limitation. The last few years have seen the electric motor replace horses in our street cars, and those who have followed the conception and growth of the electric vehicle prophesy the same revolution in the carriages, cabs, wagons, etc., in our cities. Of course, to lovers of horseflesh this change will not appeal, for the substitution of a controller for a well-bred animal would deprive them of the principal pleasure of locomotion. There certainly can not be the same sympathy and affection between the owner and the electric motor as there is between him and an intelligent animal; but for commercial uses, where dollars

and cents, and not sympathy, count, the case is different, and there are many reasons why the electric vehicle should supersede our present methods.

The cost of accomplishing by electric vehicles the work now done by horses would be probably one-half, when their adoption has become to any extent general, thus enabling the work of recharging the batteries to be organized on a proper scale.

There is an immense advantage from a sanitary point of view. Think of the hygienic measures necessary to care for the refuse of 100,000 horses, both in the stables and on the streets. This is about the number of horses in Philadelphia. Again, if the wear and tear of these 100,000 horses traveling over the streets and roads were done away with, how much simpler the problem of good roads would be. The electric vehicle possesses so many advantages over those propelled by oil or gas motors that, except for special conditions, where extremely long distances have to be covered without charging facilities, there seems to be little, if any, doubt that the former type will be the one to fill the field.

Briefly stated, the advantages of the electric vehicle over oil or gas motors are as follows :

Safety—A storage battery will not explode, nor is it inflammable, like gasolene or kerosene.

Ease of Handling and Control—An electric motor, with its controller, is certainly the ideal method of control, and is distinctly not in the same class with the levers and valves necessary to operate an engine.

Absence of Noise and Vibration—Here, again, the electric motor is the ideal motor for the purpose, having a smooth rotary motion, instead of a reciprocating action, with its noise and vibration.

Absence of Heat and Smell—An oil or gas motor must, of necessity, be accompanied by considerable heat, and usually requires a water-jacketed cylinder. From the exhaust there is an objectionable odor, due to the unconsumed gases ; but with the electric motor neither of these objectionable features exists.

Cost of Operation—There is no doubt, from independent tests made, that a vehicle can be propelled electrically with less consumption of energy than any oil or gas motor.

There are many other points which might be touched upon, but these will suffice. For city use, the question of large mileage capacity does not handicap the electric vehicle in favor of the oil or gas motor, as the supply of electricity can be renewed as desired by recharging the batteries.

The electric vehicle of to-day is the result of much arduous and expensive experimental work, and this club has the honor of containing among its members two gentlemen who have been foremost in the development of the electric vehicle in this country.

Messrs. Morris and Salom first took up the question in 1894, at which time very little had been done, either in this country or abroad, and the numerous problems of motors, gearing, wheels, tires, bearings, running gear, etc., had to be investigated and solved without the light of previous experience. The first vehicle they designed without regard to appearance, their object being to ascertain the best type for self-propulsion through all sorts of streets, considering especially the features of weight, size, mileage and distribution of machinery. It weighs 4,250 pounds, without passengers. Its mileage capacity, on one charge, was 50 to 100 miles, according to speed and grade. The battery weighed 1,600 pounds. The motor was three-horse-power nominal, but capable of developing nine horse-power for a short period, weighing 300 pounds. The maximum speed attained was 15 miles. It was most successful and traveled hundreds of miles without accident.

The data obtained from this proved that on good pavements a vehicle weighing, with passengers, 5,000 pounds could propel itself at a speed of 10 miles an hour, with an expenditure of energy not over three and one-half horse-power or seven-tenths horse-power per 1,000 pounds.

ELECTRIC RAILWAY NOTES.

The quarterly report of the Herkimer, Mohawk & Frankfort, N. Y., Electric Railway Company for the quarter ended June 30 shows gross earnings, $9,816.95 ; operating expenses, $4,627.50 ; net earnings, $5,189.45 ; net income, $3,159.95.

The directors of the Metropolitan Street Railway Company, of New York city, have declared a dividend of $1.25 per share upon the present capital stock of the company of $30,000,000, payable October 15, to stockholders of record August 31. Transfer books will be closed for the purpose of the cash dividend and for the allotment of new capital stock on August 31, and will remain closed until September 12.

At the annual meeting of the stockholders of the Baldwinsville, N. Y., Heat and Light Company, the following directors were elected : W. F. Morris, J. W. Upson, W. H. Wells, J. T. Wilkins, W. H. Hoffman, all of Baldwinsville ; Bartlett Smith, of Syracuse, and J. W. Stearns, of Akron, N. Y. At a subsequent meeting of the directors the following officers were elected : W. F. Morris, president ; W. H. Hoffman, vice-president ; J. T. Wilkins, secretary and treasurer.

At a recent meeting of the Escanaba, Mich., Electric Railway Company, the company was reorganized and officers elected as follows : President and manager, A. R. Moore ; vice-president, O. B. Fuller ; secretary, I. C. Jennings ; treasurer, Edward Erickson ; directors, J. B. Moran, A. R. Moore, J. K. Stack, M. H. Grover, Edward Erickson. The line will be put into good condition and inside of 90 days connection will be made at Wells with the Soo line. Additional cars will be purchased and sheds built. Parks and resorts will be made along the Escanaba River, and it is expected in the near future the road will be extended to Gladstone.

The report of the Brooklyn, N. Y., rapid transit railroad companies for the quarter ended June 30 shows: Brooklyn Heights Railroad—Gross earnings, $1,345,710; operating expenses, $798,414 ; net from operation, $547,295 ; other income, $68,988 ; gross income, $616,284 ; fixed charges, $483,793 ; net income, $132,490 ; cash on hand, $348,047 ; profit and loss (surplus), $18,387. The net income for the corresponding quarter last year was $107,408. Brooklyn, Queens County & Suburban—Gross earnings, $203,210 ; operating expenses, $100,085 ; net from operation, $103,125 ; other income, $5,187 ; gross income, $108,312 ; fixed charges, $92,835 ; net income, $15,477 ; cash on hand, $90,607 ; profit and loss (deficiency), $363,682. The net income for the corresponding quarter last year was $7,819.

Following Up Correspondence.

I am personally acquainted with a certain manufacturer who is very careful in keeping track of his correspondence. Every letter that goes out of the office is recorded in a book in addition to the regular carbon copy which is preserved. Every letter that comes into the office is recorded in this same book and checked up against the previous correspondence which may have been sent out. If a letter goes out on any subject and no reply is received within 10 days, a second letter is sent, politely worded and endeavoring to find out if the first letter reached its destination, and covered the points which the correspondent wished to know.

If no reply is received to this second letter within 20 days the manufacturer writes again to express a hope that he has not been overlooked in placing the order. This letter is accompanied by a stamped and addressed envelope, in which the party written to can answer if so disposed. It is usually the case that some kind of a reply is received by this time. The reply gives the manufacturer a chance to correct any misunderstanding or oversight which may have occurred through his not fully understanding the needs of his possible customer, and always leaves him in a position to correspond, at some future day, with his prospective customer.

The manufacturer tells me that, through this careful system of following up correspondence, it has been found that probably 25 per cent of the orders received would never have been secured had only one letter been written.—*Charles F. Jones, in Printers' Ink.*

INDUSTRIAL NOTES.

The Western Telephone Construction Company, of Chicago, is mailing to independent telephone exchanges copies of its "Wall Poster A," containing valuable information relative to equipment of party lines, use of repeating coils, construction of long-distance lines, with a view to obviating cross-talk and induction disturbances generally, etc. The poster will be mailed to any one on application. The company states that its "H. C. D." combined carbon and fuse arrester has been shown, by careful and severe tests, to be an article of real merit and value.

The New York & Ohio Company, manufacturers of the celebrated Packard transformer, have recently brought out their latest model, which is to be known as "Model 98." The results secured on this new model are said to be something considerably ahead of anything that has been secured heretofore in the way of transformer regulation and efficiency. The Electric Appliance Company, Chicago, general western agents for the Packard transformer, are distributing special circulars of the same giving tabulated results of a number of tests. The manufacturers of this transformer are prepared to guarantee these results on each and every transformer sold, and a large Fall trade is looked for on the "Model 98."

EXPERIMENTS ON INDUCTION COIL CONDENSERS.

BY ALFRED G. DELL.

I made the following experiments to determine something concerning the nature of the extra current or sparks which enter the condenser of an induction coil from the break of its interrupter. I will first explain the condenser used and the arrangements connected thereto. The condenser is made of tinfoil and paraffined paper, sufficient being used to suit the ordinary battery strength I used. It was built up after repeated trials until it was of sufficient capacity but no more. In case the battery should be somewhat stronger at times, especially at renewal, I used a small condenser as an auxiliary. I also, where advisable, used only half the battery strength, sometimes using in that case the small condenser and sometimes the larger one, but most always trying all combinations of the condensers. The main condenser is most too large for the energy when the battery is halved.

I used the same arrangement of condensers and battery in making the experiments described in the ELECTRICAL REVIEW of July 20, 1898. In the above mentioned article, I stated that the induction coil has an interrupter and condenser of its own, but in making these experiments its interrupter was locked so it could not move, and of consequence, its condenser was out of use. I wish to state that I tested whether the locked condenser had any effect before making the experiments described in the above mentioned article. The separate interrupter and coil are the same as described in that article, excepting that I have added additional binding posts necessary for these experiments.

The condenser connections are arranged as shown in the sketch herewith; *f*, *g*, *h* and *i* are binding posts; *k* and *l* are the two switches; *b*, the break of the interrupter; and *m*, the condenser. When the switches *l* and *k* are thrown on the points *c* and *d*, the condenser is in shunt with the break, and any additional condenser can be connected at *g* and *h*. When the switches are on *a* and *e*, there is no condenser in play, unless one is connected to *i* and *f*.

It must be kept in mind that the condenser is just large enough for the full battery strength and no more, so there is only just encouragement enough for the extra currents to enter the condenser with the switches on *c* and *d*. Where wire was used, it was always copper, with the connecting ends made bright, unless otherwise stated.

The experiments described below were made by connecting *h* and *i* with whatever was used to test, and the switches were *l* on *e*, and *k* on *c*; where two pieces of wire were used, one connected to *f* and *g* and the other to *h* and *i*, the switches were on *a* and *e*.

Rapid throws were also made during the experiments with the switches, between *a* and *c*, and *d* and *e*. The results of the tests were also obtained by watching the spark gap in series with the secondary of the induction coil, and the size and frequency of the sparks at the break of the interrupter.

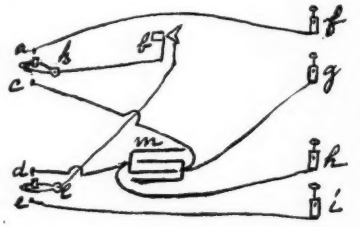

DIAGRAM ILLUSTRATING "EXPERIMENTS ON INDUCTION COIL CONDENSERS."

I connected *h* and *i* with a galvanometer, placing the connecting wire down on the glass as close to the needle as possible. I found the sparks passed into the condenser, but found not the slightest deflection of the magnetic needle. I connected *h* and *i* with a long wire, and found that with half my battery some of the sparks did not pass into the condenser. I then connected *f* and *g* with another wire of equal length and size, and found the number of sparks that missed the condenser was increased. I then put on the full battery, and found the sparking at *b* was considerable. When equal wires were between *f*, *g*, and *h*, *i*, the sparking seemed to double that when only one wire was used.

I tried wires of various lengths and found with No. 20 wire, five and one-half feet, the sparking at *b* was little with half battery, but with full battery it was considerable. With the same length of No. 16 soft iron wire, with full battery, scarcely any sparks entered the condenser, even with the iron wire of only two feet; many sparks appeared at *b*.

Wire as large as No. 14 of considerable length would cause sparking at *b*. I fastened two wires to a block of wood, with about an inch of each at an end parallel and close together, and filled up the intervening space with gilding solution, such as sold in paint stores, and attached the free ends to *h* and *i*, and I found no sparks at all would pass into the condenser with one-half battery. It has a high resistance for battery currents, but is a good conductor of secondary discharges of a coil.

The solution is very cheap, and I found when a piece of pasteboard was covered with it, it made a fine screen to place between a Crookes tube and a fluoroscope to carry off to earth the electrostatic discharges coming from the tube. It is very transparent to X rays.

I attached up a cell of bichromate of potash battery, connecting one pole to *h* and the other to *i*, and found the sparks passed freely into the condenser. I tried three old induction coils, which I have had on hand for a number of years; they are small affairs, one rated as one-fourth-inch, another three fourths-inch, and the other one-inch maximum sparking capacities. I connected between *h* and *i* a primary of each, one at a time, their breaks being closed, but failed to send any sparks from the break through them into the condenser. They are in perfect working order.

I failed to obtain any light in Geissler tubes from the sparks passing into the condenser, try as I might.

I succeeded in obtaining sparks between two wires attached to *h* and *i*, but only when I would separate them; but when they were apart the least distance the condenser would not act.

I attached a battery cell between *h* and *i*, and connected to the same binding posts one of the small induction coils, but failed to distinguish any difference in the sparks obtained between a spark gap in the secondary of the small coil.

I tried every way I could think of to make the extra current produce some visible effect when it entered and left the condenser, but I have failed completely, and have but little hope of future success. At break, if favorable, the so-called extra current rushes into the condenser, and then there are three possibilities—first, the extra current may be dissipated in the condenser; second, the condenser may discharge at next make; third, it may, immediately while the break is still open, discharge around the circuit, as generally supposed.

If the first or second action is correct, the destruction of the sparks or extra current makes the sparks obtained in the secondary of the coil. If the third is the true action, the outrush of the extra current through the circuit does work, and makes the sparks in the secondary of coil. It must not be concluded, because I did not succeed in passing the extra current through the primaries of induction coils into the condenser, that the third condition would be impossible on that account. It must be remembered that the favorable condition to discharge at break of interrupter is not present when the circuit is entirely open. I have given the results of my experiments to the best of my ability, and leave the reader to draw his own conclusions.

ELECTRIC LIGHT FLASHES.

The Sedalia, Mo., Water and Light Company plant has been sold to a syndicate for $400,000.

The earnings of the Edison Electric Illuminating Company of New York for July were as follows:

	1898.	1897.	Increase.
Gross.....	$196.400 50	$162,453 48	$33,947 02
Net...	66,552 30	59,034 50	7,517 80
Gross, seven months..	$1,738,123 46	$1 391.219 79	$346,903 67
Net, seven months....	751,760 07	630 749 02	121,011 05

The Grand Rapids Consolidated Water Power Company decided at a recent meeting to build an immense dam over 800 feet long and 30 feet high on the Wisconsin River at Grand Rapids, Wis., at a cost estimated at $100,000. The plans of T. W. Orbison, a hydraulic engineer, of Appleton, have been adopted by the company. The dam will develop about 12,000 horse-power, and will be modern. The dam is to be completed by next Summer.

The Union County Board of Freeholders has granted a franchise to ex-Congressman John Kean for a trolley road between Elizabeth and Plainfield, N. J., for the sum of $250,000. The county will spend the money to widen the county boulevard to 100 feet, making two wagon roadways and two bicycle paths for the entire distance of 12 miles. In addition to the $250,000 in cash, ex-Congressman Kean agrees to pay four per cent interest on any amount in excess of that figure it costs to complete the boulevard improvement.

The Brooklyn Heights Railroad Company began last week the construction of a new trolley route to Bensonhurst, N. Y., by placing a curve from the Flatbush avenue tracks into Avenue C. The residents of the latter avenue were taken by surprise when the operations began, as they believed that the project had been abandoned through the supposed failure of the company to get the necessary consents.

The Utility of Primary Batteries.

[*From the Electrician, London.*]

The introduction of electric light did not lead to the abolition of candles. Similarly, when the dynamo was sufficiently perfected to become a commercial generator of electric currents, primary batteries did not wholly fall into desuetude. Compared with the arc or incandescent lamp the candle is a highly expensive illuminant, when estimated on the basis of pence per unit of light per annum; but there are probably quite as many, if not more, candles made nowadays as there were in the days of our grandfathers. Moreover, not only has the bulk of the candle trade probably increased to a considerable extent, but there has been maintained a steady improvement in the quality of the individual candle. Rush-lights and tallow "dips" have given place to articles made from paraffine wax compounds that give a brighter, steadier and less smoky light for less money. He would be rightly regarded as a short-sighted fool who should make the existence of the arc or glow lamp a pretext for decrying any effort to improve the quality and cheapness of the homely candle. Yet there are individuals whom one would hesitate to class in the same category, but who never lose an opportunity to deprecate every attempt to bring the primary battery to a higher pitch of commercial success, because, forsooth, no primary battery can ever be constructed that will produce electrical energy so cheaply as it can be generated by a steam-driven dynamo. If it is conceded that, notwithstanding the prevalence of dynamo power stations and isolated steam-driven plants, there is a place in civilization for the primary battery, and a place that is better filled by it than by any other electrical generator. There should be no obstacle to perceiving that the best that can be should be done to make the primary battery perfect. Unfortunately, the uncompromising hostility of a certain section of the electrical fraternity towards every new form of primary battery put on the market is excused, to a considerable extent, by the readiness with which the development of primary battery generators lends itself to the imposition of fraud upon a gullible and indiscriminating public. Such frauds have been numerous in recent years, and the most transparently preposterous claims have been advanced from time to time on behalf of electro-chemical monstrosities that a well advised person would not employ for the most meager electrical duty. When the impression is fostered in the mind of the investing public that a particular new primary battery contains all that is essential to work a revolution in every electrical industry, to relegate every dynamo to the scrap-heap, and to produce a rapid succession of financial disasters in central stations and in works of the kind illustrated and described in an early part of our issue this week; and when this species of knavery is practiced over and over again with successive bogus batteries, it is only natural that novelties in the nature of primary batteries should be looked at askance by the investing public and by cautious electricians. Wholesale and indiscriminate condemnation, however, has its mischievous aspects, since thereby the legitimate development of a genuine improvement is liable to be thwarted. There are certain lines along which it has long been known the improvement of the primary battery might conceivably be directed, and success would inevitably lead to extension of the usefulness of this class of generator. To mention only one or two, it is evident that if the evils of local action and polarization could be minimized or eliminated altogether, or if it were possible to use cheaper materials for working the battery, considerable advance would be made. Taking any one of the text-book primary cells as a datum point—the Grove, the Daniell, or the bichromate cell—no one can deny that all the improvements we have named are well within the bounds of practical possibility. To achieve them all would indisputably justify the proprietors of the improvements in placing their battery on the market, and the public might reasonably anticipate that a company with a moderate capital would become a dividend-earning concern. These remarks we make with a view to emphasize the fact that there is nothing inherently impossible, nor even improbable, in a well organized company being run successfully on the merits of a new primary battery. We do not say, however, that the battery that is to achieve this has yet been invented. There has recently been brought before the public by the New Electricity Supply Syndicate a primary cell that seems to possess in many respects the essential elements of commercial success. It is an iron-consuming combination, the fluid portion of which is a diluted mixture of sulphuric and nitric acids; while the insoluble cathode consists of a number of carbon rods placed within rows of porous tubes; and although the cell is open over the portoin containing the iron anode, the porous tubes are sealed. Successive cells are connected by inverted U-tubes, and each cell is at a slightly lower level than the next one in the direction of the reservoir of active fluid. The lowest cell in the series discharges the exhausted fluid into a waste-pipe. The reservoir of mixed acids communicates with the inner space around the carbon rods, and this fluid only reaches the water, which is kept in circulation through the outer space, by diffusion through the porous partitions. The object of this arrangement is to prevent local action when the cell is not in use, and the porous tubes are closed in order that the pressure of the liberated gas may serve to force acid fluid into the outer space in proportion to the current generated. Immediately the battery is thrown out of action the outer spaces of the cells are flushed with water, thus driving out every trace of acid from around the iron anodes. Tests of this battery have been made by Prof. S. P. Thompson and by Mr. H. T. Harrison, and two reports by the former and one by the latter have been published. According to the most recent report by Professor Thompson the battery is devoid both of polarization when in use and of local action when lying idle, while the tests show that the cost of materials for working the battery is at the rate of 6¼d. per Board of Trade unit, to which estimate of cost, however, there must be added the expenditure on attendance, depreciation and interest on capital. Apparently the initial outlay on this plant is considerably below what would be required for a small steam or gas-driven plant of small capacity; while it will be evident that, if the battery fulfills the promise of the tests made upon it, the cost of attendance will be much less than for the usual kind of isolated electric light plant. It is only fair to say that Professor Thompson was at first skeptical as to the possibility of attaining these results, "but the detailed figures of repeated experiments left no room for doubt." We should also add that the stated cost per unit appears to be based upon the current quotations for iron and acids in large quantities. Where, as in general would be the case, comparatively small quantities of these materials would be used in places remote from centers of commerce, the estimated cost would have to be increased by the difference between wholesale quotations and the price of small quantities delivered; it would also have always to be supplemented by the depreciation in value of the residual anode iron taken from the battery on renewing the anodes. But even should the entire cost, including all charges, swell to the apparently alarming figure of 1s. 6d. or 2s. per unit—as, indeed, it might do in small, country installations—the success of the battery need not thereby be impaired, provided only it will answer the requirements in every other respect. The relatively high price would not deter a well-to-do resident in a country mansion, who could not obtain electric light in any other way. Even so near London as between Oxford and Richmond, owners of electric launches are glad to get electric energy at 1s. 6d. per unit, that being the price charged by the Immisch Electric Launch Company. No, in our opinion, the success of the new primary battery does not rest upon whether it can generate current for 6d. or 1s. 6d. per unit, but must depend entirely upon whether it can be installed and used continually without inconvenience from frequent need of repairs, or the annoyance due to bad smells and a voltage that asymptotically approaches zero. Not the brief tests of experts, but the test of time and actual, practical use will settle such points as these.

Galvanism to Detect Diseased Teeth.

Aldini, nephew of Galvani, discovered that it was possible, by the aid of galvanism, to distinguish good teeth from bad. The passage of the current through the teeth gives rise to no discomfort when healthy; but its application to a decaying molar, for example, is followed by violent pain, "and an involuntary motion of the body." The *Medical Press*, June 15, from which the above is extracted, goes on to say that, "now that their attention [dentists] has been called to a discovery some centuries old, there will be less excuse than ever for such a blunder" as that of removing a sound tooth by mistake.

It is announced that the General Electric Company has purchased the plants of the Schenectady, N. Y., Street Car Company and the Schenectady Illuminating Company, and will hereafter operate both plants with its own power, soon to be obtained from the Hudson River at Mechanicville, N. Y.

ADVANCE INFORMATION

New Telephone and Telegraph Companies.

WILBUR, WASH. — The telephone line from Spokane to this place has been completed.

CANAAN, N. H.—The New England Telephone Company have decided to extend their line from this place to Franklin.

LONG CREEK, ORE.—The telephone line connecting Burns with Canyon City is now completed.

COLVILLE, WIS.—W. B. Aris and W. H. Oakes have just completed arrangements to construct a line of telephone from Meyers Falls to Fort Spokane, a distance of 60 miles. This line will traverse the country tributary to the Columbia River, and will accommodate a large population living in the Columbia River valley, in this county.

CENTRAL, S. C.—The Central Liberty Telephone Company has been incorporated, with T. N. Hunter, president and general manager, and H. L. Clayton, secretary and treasurer, for the purpose of constructing a telephone system from Central to Liberty, in Pickens County.

AMARILLO, TEX.—T. F. Moore has closed contract for the construction of a telegraph system between Roswell and this place.

COLUMBUS, GA.—The Southern Bell Telephone and Telegraph Company contemplates making extensive improvements to its system at a cost of about $30,000.

HILLSBORO, TEX.—Dock Jarvis, of Hubbard, and Tice Moreland, of Rienzi, are endeavoring to form a company for the construction of a telephone system from this place to Hubbard and Mount Calm.

WARREN, PA.—Warren Telephone and Telegraph Company has been incorporated; capital stock, $500; authorized, $25,000.

ERIE, PA.—Union Telephone and Telegraph Company has been incorporated by Geo. Chilton, E. K. Reedy, E. M. Estell, P. C. Russell, D. J. Keefe; capital subscribed, $500; amount authorized, $1,000,000.

PORT LAVACA, TEX.—Capt. F. V. Gentry will erect a private telephone line.

ADRIAN, MINN.—The Midland Telephone Company has been incorporated by Dan Shell and others; capital stock, $50,000.

NEW RICHMOND, WIS.—The People's Telephone Exchange has been organized, with Charles N. Gorham, president; A. J. Presson, vice-president and manager; Wm. Hughes, secretary, and Dr. Epley, treasurer, for the purpose of conducting a telephone exchange in this place.

FROSTBURG, MD. — The Postal Telegraph Company is distributing poles through this city and along the National Pike for a loop from Uniontown, Pa., to Cumberland, Md.

Electric Light and Power.

MATTOON, ILL. — The Mattoon Light, Heat and Power Company has been granted a 20-year franchise by the City Council, and will at once begin the work of building a plant.

BERLIN, PA.—The Berlin Electric Light Company has been incorporated; capital, $4,000. Directors, W. S. Matthews, Berlin; J. A. Berkey, G. B. Haugh, J. M. Bricker and H. F. Barron, Somerset.

VEEDERSBURG, IND.—The Water and Light Company has been incorporated, with a capital of $5,000. The incorporators are John H. Brown, B. O. Mayer and F. McClellan.

CADILLAC, MICH. — George D. Westover, superintendent Cummer Electric Light Company, may be addressed concerning an addition of a power plant to their present lighting plant.

TALCOTTVILLE, CT. — Talcott Brothers have made arrangements to put in an electric light plant, to furnish lights for their factory and residence and some of the public buildings of the city.

WATERTOWN, S. D.—O. M. Kirlin and others have been granted franchise for the erection of an electric light plant.

MORGANTON, N. C.—The Morganton electric light plant has been purchased by the bondholders for $5,000.

SEBASTOPOL, CAL. — An electric light plant is to be established here.

NORFOLK, VA.—The Norfolk company will expend about $500,000 in the improvement of its property contiguous to Ghent; this includes electric light plant, etc.

GRAFTON, W. VA.—The Mayor may be addressed concerning proposed construction of electric light plant, for which $10,000 worth of bonds will be issued.

NEW YORK, N. Y.—Mexico City Light, Heat and Power Company has been incorporated by Andrew L. Conary, Frederick Johnson and others; capital subscribed, $500; amount authorized, $2,000,000.

New Electric Railways.

ST. LOUIS, MO.—The Lead Belt Railway Company has been incorporated; capital stock, $4,000. Incorporators, J. H. Bethune, Arthur Thatcher, W. E. Guy, F. H. Ludington, H. J. Cantwell, W. T. Gould and C. S. Rodgers, all of St. Louis. This company is chartered to build and operate a standard-gauge railroad from the Mississippi River and Bonne Terre Railroad at Central Station to the Central Lead Company, a distance of four miles, all in St. Francois County.

WOMELSDORF, PA. — There is a movement on foot to build an electric railway between this place and Myerstown. A charter is to be applied for. The line will be laid on the Berks and Dauphin turnpike. The construction of the new road will complete a continuous line of electric railway from this city to Lebanon.

HAGERSTOWN, MD.—It is said a movement is on foot to revive the project of building the trolley line between Waynesboro and Pen-Mar and adjoining resorts.

INDIANAPOLIS, IND. — The Dunkirk & Redkey Traction Company has been incorporated, with a capital of $75,000. The road will run from one town to the other through Jay County. The incorporators are H. C. Billingsley, Charles A. Hasbrouck, Elmer Bishop and W. H. Kewser.

UTICA, MICH. — The Detroit & Romeo Rapid Railway Company has been granted franchise for an electric road.

NORTHVILLE, MICH. — A 30-year franchise has been granted to the Detroit, Plymouth & Northville Electric Railroad Company to construct their line through this town. The fare to Detroit is to be 35 cents; 15 cents to Wayne and 5 cents to Plymouth, while school children are to be carried on the eight-for-a-quarter rate.

Increase of Capital.

INDIANAPOLIS, IND.—The capital stock of the New Telephone Company has been increased to $400,000.

FRANKFORT, KY.—The Houstonville and Green River Valley Telephone Company has increased its capital stock from $750 to $1,000.

CATSKILL, N. Y.—The Catskill Electric Railway Company has increased its capital stock from $30,000 to $400,000.

NEW YORK, N. Y.—The Metropolitan Street Railway Company has increased its capital stock from $30,000,000 to $45,000,000.

Electrical.... Patents.

[Specially reported for this journal by E. S. Duvall, solicitor of patents, Loan and Trust Building, Washington, D. C. Copies of any patent may be secured for 10 cents each.]

ISSUED AUGUST 2, 1898.

(Concluded.)

608,389 Rapid telegraphic transmission on cable lines; C. L. Davies, London, England.

608,412 Joint for electric conductors; H. S. Patten, Montclair, N. J.—Consists of the conductors and their couplings or connections of tubes surrounding the conductors and having screw-threaded ends, a two-part case having tapering ends and screw rings upon the ends of the tubes passing over the conical ends of the divided case and holding the same in position.

608,415 Device for recording and reproducing music; E. K. Adams, New York, N. Y.

608,496 Coin-controlled medical battery; N. M. Watson, Detroit, Mich.

608,497 Electric headlight lamp; H. P. Wellman, Ashland, Ky.—An electric lamp having a parabolic reflector, a translucent elongated cylindrical casing projected at its ends through said reflector, closures over the ends of said casing, a support for said casing outside of said reflector, carbon carrying rods extending through said closures and carbons secured to the inner ends of said rods and located wholly within said casing.

608,504 Telephone transmitter arm and its attachment; W. J. Barr, Ashtabula, Ohio.

608,537 Battery electrode; H. E. Wilkinson, Mount Vernon, Ohio—A battery plate constructed of resilient spring metal and provided with a pocket having a front side sloping inward toward its bottom, and ends which converge in a downward direction and are at angles to the sloping front side.

ISSUED AUGUST 9, 1898.

608 614 Plate for secondary galvanic batteries and composition for producing same; Carl Marschner, Berlin, Germany—Composed of an exterior perforated containing frame of lead and a filling of an active material such as lead oxid, and a binding medium composed of a solution of a fossil gum.

608,685 Lightning arrester; J. F. Kelly, Pittsfield, Mass.—Consists of a column of conducting or semi-conducting bodies in bad contact with one another, as a whole practically non-conducting under ordinary electric stress, but under high stresses conducting, with suitable terminals for the line, in contact with the column respectively.

608,710 Electric motor; W. H. Powell, Erie, Pa.—A compound-wound electric motor having each of its poles divided into three or more parts, the end parts carrying shunt windings and the middle parts the series windings.

608,714 Storage battery; J. D. Rively, Pittsburgh, Pa.—Consists of a series of perforated boxes, and of layers of fiber, oxid of lead, and plates of conducting material, said plates terminating in positive and negative poles.

608,721 Automatic electric regulator; R. Skeen, St. Louis, Mo.

608,723 Electric arc lamp; T. Spencer, Philadelphia, Pa.—The method of operating an alternating-current arc lamp consisting in automatically reducing the inductance of the arc circuit when the lamp is starting into action.

608,768 Electro-dynamic apparatus for operating clipping, brushing or other mechanisms; W. P. Freeman, New York, N. Y.

608,842 Electric meter and motor; H. P. Davis, Pittsburgh, Pa.

608,846 Telegraph repeater; H. P. Donnelly, Cincinnati, Ohio.

608,878 Switch for varying electrical resistance; E. F. H. H. Lauckert, London, Eng.

608,895 Generator for electrical igniters; B. McInnerney, Omaha, Neb.—An electrical generator for electrical igniters for gas engines consisting of a permanent magnet and a wire-wound core arranged in proximity, an adjustable support therefor, means for adjusting said support during the operation of the engine and keepers attached to a moving part of the engine.

608,896 Generator for electrical igniters; B. McInnerney, Omaha, Neb.

608,906 Insulation of electrical wires; J. A. Poche, New Orleans, La.—An insulation for conductors carrying currents of high potential, consisting of a surrounding insulating sleeve and two enclosing glass cones, retained by a collar at one end and a nut at the other.

608,911 Electrical cable; H. A. Reed, Newark, N. J.—Consists of the conductor and the insulating covering therefor, of a sheathing or armor for said cable consisting of spirally-laid wires of non-magnetic metal.

608,932 Telegraphy; G. V. Trott, Chicago, Ill.

608,952 Electrical cooking apparatus; J. B. Cary, Baltimore, Md.—Consists of two boxes, each one having therein heating wires and a corrugated tray situated over

the wires, and strap hinges, one member of the same being adjustably attached to a box whereby the boxes may be separated and held in a separated position.

ISSUED AUGUST 16, 1898.

609,015 Electric elevator; R. Eickemeyer, Yonkers, N. Y.—An elevator and its hoisting mechanism; an electric motor coupled thereto, and a dynamo-electric governor mechanically driven by said mo or for generating electricity and distributing it in the magnetic field of the motor, and weakening said field in proportion to any increase of speed in the elevator beyond its desired or predetermined rate.

609,016 Electric elevator; R. Eickemeyer, Yonkers, N. Y.—Consists of a traveling car body or platform, a compound motor, a resistance in shunt relation to the series coil of said motor, and a solenoid automatically controlling the magnetizing power of said series field coil by gradually short-circuiting said resistance.

609,092 Electric controller; Joseph D. Forrer, Johnstown, Pa.—Consists of a pair of concentric shafts, operating levers for each shaft, means for preventing the removal of one of said levers except when it is at a predetermined position, and independent means for preventing the said lever from being removed except when the other shaft is at a predetermined position.

609,094 Method of, and apparatus for, making electrical insulation conduits; Hugo Gallinowsky, St. Louis, Mo.—Consists in wholly submerging fibrous material in a bath of oxychlorid cement, thus saturating said material from both sides, winding said fibrous material so treated on a mandrel, and then removing the mandrel before the cement completely sets by suspending the same by one end so that the mandrel will slip out.

609,124 Electric brake; E B. Skinner, Ogden, Utah—A solenoid and a plunger therefor for operating the brake mechanism, a second solenoid disposed at right angles to the first-mentioned solenoid, a lever connected at one end to the plunger of the smaller solenoid, and at the other end to links which are connected to a plate carrying a shoe, a plate having a projecting portion for engagement with the end of the lever beyond the links, a shoe carried by said plate and a spring positioned between the plunger of the smaller solenoid and the links to operate upon the lever adjacent to the plunger of the smaller solenoid.

609,142 Combined battery and electric bell; J. C. Dagoneau, Beaufort, France.

609,154 Electric telegraphy; O. J. Dodge, Liverpool, England—In a system of Hertzian-wave telegraphy, the combination, with a pair of capacity areas, of a self-inductance coil inserted between them electrically for the purpose of prolonging any electrical oscillations excited in the system and constituting such a system a radiator of definite frequency or pitch.

609,173 Telephone system; A. F. Swan, Bayonne, N. J.—Consists of the telephone apparatus, the line, and the switch barrel moved by makes and breaks in the line, of the movable switch arms directly controlling the circuit through the apparatus, and means for operatively actuating the arms by the movement of the switch barrel.

609,188 Electrical traction; William Kingsland, Llandudno, England—In electrical traction, the combination with a continuous main electrical conductor, sectional working conductors from which the motor car directly collects the current, and a number of sectional auxiliary conductors, one such for every sectional working conductor, and through which auxiliary sectional conductor the current is passed from the main conductor to the sectional working conductor aforesaid; of means whereby each sectional auxiliary conductor can be either connected to, or disconnected from the main electrical conductor, or to or from a corresponding sectional working conductor and an electro-magnetic switch operated by the automatic action of the electric current as the motor car passes from one of the sectional working conductors to the other.

609,229 Telephone system; C. E. Egan, Meriden, Ct.—A spring jack comprising a metallic frame, a drop shutter, magnet coils, a magnet armature provided with a drop shutter retaining hook, a metallic plunger fitted to reciprocate in the frame, and having a retracting frame, a slideway for a switch plug in the frame in line of the said plunger, a spring projecting into the slideway and connected with the winding of one of the magnet coils and the other coil having ground or common return line connection, and means for connecting a subscriber's line with the said frame.

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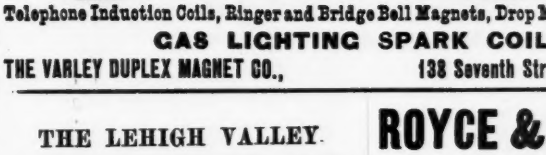
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Kindred.... ...Interests

The business of the Electric Storage Battery Company, of Philadelphia, during the month of July was about $200,000. The prospects are that the month of August will far exceed this amount, and that it will be the banner month of the company's history.

The F. & L. Push Flush Switch is one of the most successful of the Electric Appliance Company's smaller specialties. It is the smallest push switch on the market, the size of the face plate being only one and three-fourth inches by three and one-fourth inches. It also requires a very small opening in the wall, operates with a very slight pressure on the keys and has many other valuable features, not the least of which is the fact that it is sold at a price considerably below the market for a push flush switch.

The Government of Victoria, Australia, has placed an order with the General Electric Company for six Thomson recording wattmeters of 100 volts and varying capacities. These will be deposited in the electrical bureau of the home office of Victoria, and will be used as the official standards by which all electricity meters used in the colony will be tested. In future no meters measuring electrical energy will be allowed to go into service in Victoria unless they agree with those just ordered and receive the final sanction of the Victoria Government.

The following is the list of Walker Company's exhibit to be shown at the Street Railway Convention, Boston, September 6 to 9, 1898: Section of Walker underground conduit system with car in operation; Walker 15-L railway motor in operation; Walker 15-L motor, open to show construction; Walker No. 33 S motor, mounted; Walker No. 33 S motor, open; set of 33 S armatures in various stages of construction; set of 33 S motor parts; Walker standard trolley; Walker standard railway switchboard panels with wattmeter; "S" controllers in operation; solenoid partitions open and in operation.

The new insurance of the New York Life Insurance Company aggregated during 1897 over $135,000,000, which was an increase of $14,000,000 over 1896. This company is now 53 years old, and is thoroughly and systematically organized in every department. The policy of its able and energetic president, Hon. John A. McCall, is apparently to so administer his great trust that the company's policy-holders shall always reap the largest possible benefits. There are quite a number of electrical men carrying policies in this company, and the 1898 business so far has been extremely large. This company is a purely mutual company, without stock or stockholders. The policy-holders own it and enjoy its profits.

The paper read by Mr. J. W. Aydon, superintendent of the fire and police telegraph, of Wilmington, Del., before the convention of "Police and Fire Telegraph Superintendents and Municipal Electricians" held at Elmira, N. Y., August 9 and 10, possesses value not alone from a municipal standpoint, but as showing what the recent invention of the Montauk "multiphase" cable has had to do with turning the largest auxiliary fire telegraph systems in the United States and Canada from manual to automatic action, its reliability being such as to permit its use for calling out fire departments in connection with the street boxes. This is only one of the many adaptations to which the Montauk "multiphase" cable is applicable; in other and fully as important channels of practical usefulness it is being successfully carried and its future position as a factor in the commercial world seems to be assured.

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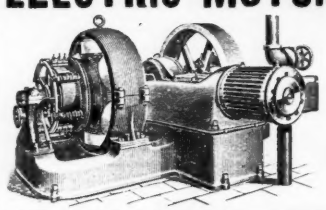
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